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SCIENCE, ENGINEERING, AND HUMANITIES DOCTORATES IN THE UNITED STATES

1983 PROFILE

The Survey of Doctorate Recipients is conducted by the National Research Council with the support of the National Science Foundation, the National Endowment for the Humanities, the National Institutes of Health, and the Department of Energy

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NATIONAL RESEARCH COUNCIL

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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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The Survey of Doctorate Recipients (SDR) project is under the administrative supervision of Betty D. Maxfield. Doris Rogowski and Eileen Milner of OSEP's Supporting Services Section supervised the coding of the returned questionnaires, and George Boyce of the Data Processing Section updated and generated the data files for the survey project. Susan Henn, programmer in the Data Processing Section, was primarily responsible for producing the summary statistics and technical appendix data included in the report. Betty D. Maxfield and Mary Belisle drafted the report and were assisted by Alan Fechter, OSEP's executive director; Linda Dix, reports editor; and Patricia King, Cynthia Ann Srisuwan, and Cynthia Dale Hale, project secretaries, in making final emendations.

J. James Brown and John Scopino served as the responsible staff officers at the National Science Foundation's Division of Science Resources Studies and, along with Arnita Jones of the National Endowment for the Humanities and George Bowden of the National Institutes of Health, reviewed the program plans and provided helpful advice to SDR staff.

The report was reviewed by members of the Panel on Data Concerning the Education and Employment of Humanities Doctorate Recipients (Richard Brod, Ernest Frerichs, O. B. Hardison, Johanna Mendelson, John O'Connor, and Margaret Wilkerson) and by the designated Report Review Committee reviewer, James H. Mulligan, Jr. Their helpful comments and suggestions were incorporated in the final document.

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Finally, the Ph.D. recipients in science, engineering, and the humanities who responded to the survey made this report possible. Their cooperation and assistance are greatly appreciated.

FOR FURTHER INFORMATION

Further analyses of the 1983 survey data will be done in 1985, and additional reports will be forthcoming. Meanwhile, questions may be directed to Survey of Doctorate Recipients, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

National Research Council reports derived from the 1973-1981 Survey of Doctorate Recipients are as follows and may be obtained from the Project office at the above address:

Science, Engineering, and Humanities Doctorates in the United States (Biennial reports beginning with the 1977 SDR)
Departing the Ivy Halls: Changing Employment Situations for Recent Ph.D.s (1983)
Employment of Minority Ph.D.s: Changes Over Time (1981)
Employment of Humanities Ph.D.s: A Departure from Traditional Jobs (1980)
Ph.D.s in Business and Industry (1979)
Career Patterns of Doctoral Scientists and Engineers: 1973-1977 (1979)
The Effects of Nonresponse Bias on the Results of the 1975 Survey of Doctoral Scientists and Engineers (1979)
An Evaluation of the 1973 Survey of Doctoral Scientists and Engineers (1976)
Employment Status of Ph.D. Scientists and Engineers: 1973 and 1975 (1976)
Doctoral Scientists and Engineers in the United States: 1975 Profile (1976) and 1973 Profile (1974)
Field Mobility of Doctoral Scientists and Engineers (1975)

The following publications of the National Science Foundation (NSF) are also based on the past five surveys:

"Growth in Employment of Science and Engineering Doctorates Continues, Lead by Computer Scientists," Science Resource Studies Highlights (NSF 82-328)*
Characteristics of Doctoral Scientists and Engineers in the United States: 1981 (NSF 82-322); 1979 (NSF 80-323); 1977 (NSF 79-306)*
"Employment Opportunities for Ph.D. Scientists and Engineers: Shift from Academia to Industry," Science Resource Studies Highlights (NSF 81-312)*
"Work Activities of Doctoral Scientists and Engineers Show Substantial Change Between 1973 and 1977," Science Resource Studies Highlights (NSF 78-316)*
"Doctoral Scientists and Engineers in Private Industry, 1973," Reviews of Data on Science Resources (1976)**
"Work Activities of Employed Scientists and Engineers in the U.S. Labor Force, July 1973," Reviews of Data on Science Resources (1975)**

*Available from NSF.
**Available from the U.S. Government Printing Office.

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SUMMARY OF FINDINGS

This report is based on the results of the sixth biennial survey of doctorate recipients. It describes the demographic and employment characteristics of over 470,000 Ph.D.s who received their degrees between January 1940 and June 1982 and who were residing in the United States in February 1983. This report summarizes an enormous quantity of information. Thus, it is impossible to highlight more than a subset of the more significant statistics included in this report. The findings included in this summary, organized around particular themes, do not necessarily follow the structure and order of the report. Thus, subheadings have been used to identify the various themes.

Population Levels and Trends

- The number of Ph.D. scientists and engineers in 1983 was estimated to be 387,300, 8.0 percent above the 358,600 estimated for 1981. Of these, 365,400 were in the labor force, 7.2 percent above the 340,900 estimated for 1981. The corresponding figures for the humanities doctorates were 85,200 (up 12.1 percent from the 76,000 estimated for 1981) and 77,900 in the labor force (up 11.8 percent from the 69,700 estimated for 1981).

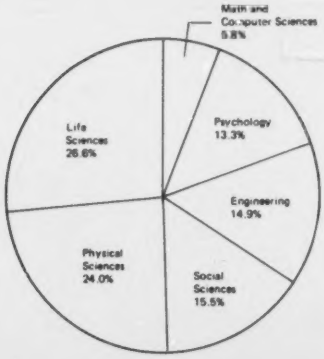

FIGURE 1-1 Science and engineering Ph.D. population, 1983 (N=387,300)

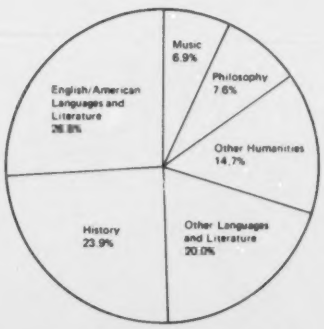

FIGURE 1-2 Humanities Ph.D. population, 1983 (N=85,200)

- Roughly one-half of the growth in the number of individuals with humanities Ph.D.s is attributable to the addition of several subfields to the humanities classification.[1] When adjusted for this change in taxonomy, the growth rate is slightly below the rate that prevailed during the 1970s. An implication of these growth patterns is that although it has been declining since the early 1970s, the annual number of new Ph.D.s who enter the U.S. population of doctorates in these fields continues to exceed the annual number of Ph.D.s who are removed because of death or emigration.
- The growth rates varied dramatically by field. Among the science/engineering disciplines, the most rapid growth occurred in medical sciences, where the rate of increase was 32.4 percent from 1981 to 1983. Among the humanities disciplines, rapid growth was noted in art history and music, where increases of 20.0 and 15.7 percent, respectively, were observed.

Labor Force Utilization and Underutilization

- Almost all of these Ph.D.s are actively involved in the labor force (i.e., working or seeking work), and most in the labor force have jobs: approximately 94 percent of the science/engineering Ph.D.s and 91 percent of the humanities Ph.D.s were in the labor force. Of these, roughly 99 percent of the scientists/engineers and 98 percent of the humanists were employed. Unemployment rates for females, however, were substantially higher than unemployment rates for males (2.6 percent versus 0.8 percent for Ph.D.s in science/engineering fields; 3.3 percent versus 1.1 percent in humanities fields). To provide perspective to these figures, comparable unemployment rates for the general labor force were 9.9 percent for females and 10.8 percent for males.
- While most of the Ph.D.s have found jobs, many may be involuntarily underemployed--i.e., working part-time but preferring to work full-time or working in an occupation outside one's field of degree because of the lack of suitable employment opportunities in one's degree field. Roughly one percent of the labor force of science/engineering Ph.D.s and almost 3 percent of the labor force of humanities Ph.D.s reported that they were working part-time but were seeking full-time employment. In addition, about 6 percent of the labor force of scientists/engineers and almost 18 percent of the humanists were working in nonscience/nonengineering or nonhumanities jobs.
- In the humanities almost 5 percent of the labor force of Ph.D.s in modern language/literature were employed part-time but seeking full-time positions. Among the science/engineering fields, almost 2 per-

---

[1]These fields were (1) history and philosophy of sciences (N = 309 Ph.D.s) under history; (2) linguistics (N = 2,289 Ph.D.s) under social sciences; and (3) archeology (N = 584 Ph.D.s) under social sciences.

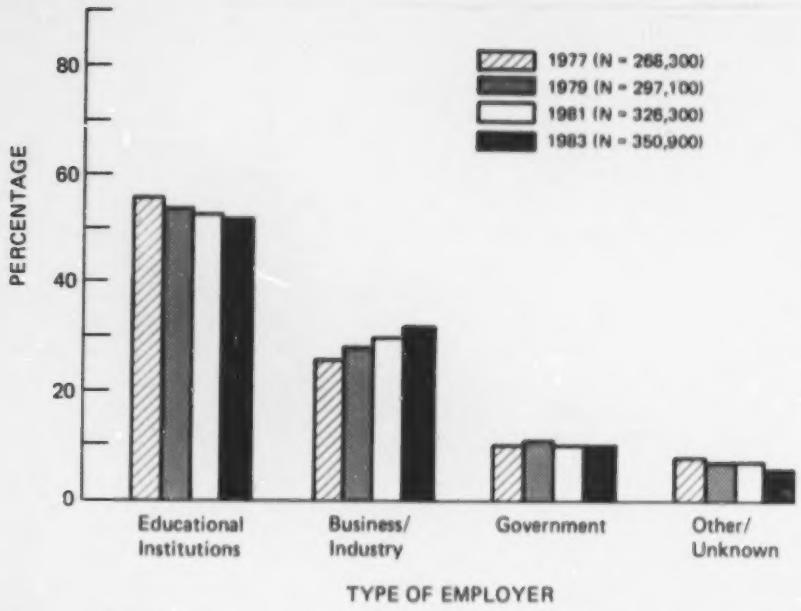

FIGURE 1-3 Distribution of employed doctoral scientists and engineers by type of employer (excluding postdoctoral appointees), 1977, 1979, 1981, and 1983

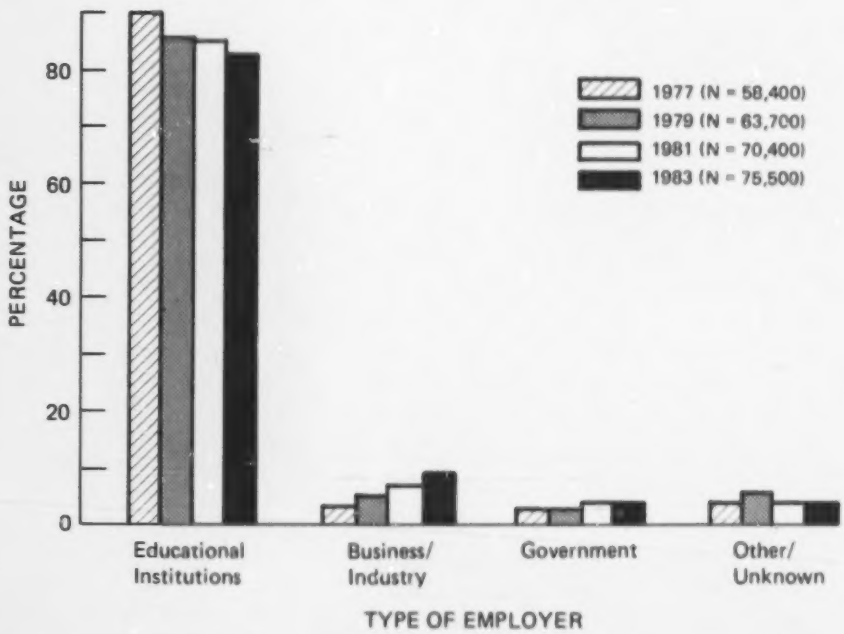

FIGURE 1-4 Distribution of employed humanists by type of employer (excluding postdoctoral appointees), 1977, 1979, 1981, and 1983

cent of the labor force of doctorates in psychology were seeking full-time employment. These rates of part-time employment varied dramatically by sex (2.8 percent for females versus 0.7 percent for males with science/engineering doctorates; 5.5 percent for females versus 1.7 percent for males with humanities doctorates).

- Field differences were also found in nonscience/nonengineering and nonhumanities employment. Among science/engineering fields, roughly 15 percent of the labor force of doctorates with degrees in social science were employed outside their broad field; several humanities fields experienced percentages in excess of 20 percent: philosophy (23.5), history (22.9), speech/theater (22.7), and "other humanities" (22.6). A notable gender difference in nonscience/nonengineering employment was almost entirely attributable to gender differences in field distribution. Female doctorates are disproportionately employed in social sciences, where (as noted above) their nonscience/nonengineering employment rate is relatively high.

Trends in Job Opportunities

- Job opportunities for science/engineering and humanities doctorates have been changing over time. Approximately 52 percent of the employed Ph.D.s in science/engineering had jobs in educational institutions, down almost 6 percentage points since 1973 (the first year the scientists/engineers were surveyed). Roughly 32 percent were employed by business/industry, up about 8 percentage points since 1973. Approximately 83 percent of the humanities Ph.D.s were employed by educational institutions, 5 percentage points lower than in 1977 (the first year the humanists were surveyed).
- Work activities continue to reflect the distribution of these doctorates by type of employer. Because of the continued dominance of educational institutions, approximately 33 percent of the employed science/engineering Ph.D.s were engaged in research, development, and design work, while 30 percent were primarily engaged in teaching.
- The role of educational institutions is also reflected in the activities of humanists. Approximately 66 percent of the employed Ph.D.s in the humanities were engaged primarily in teaching, while 11 percent were engaged in management/administration. Unlike science/engineering disciplines, however, research, development, and design were not prominent activities.

Salary Trends and Patterns

- The median annual salary for full-time employed doctoral scientists/engineers was $40,200 in 1983 (approximately double since 1973 and up by roughly 9 percent since 1981). Salaries for Ph.D. humanists also increased, rising to $30,700 in 1983. This represents a 16 percent increase since 1981. These statistics, however, do not reflect trends in purchasing power, which increases only if

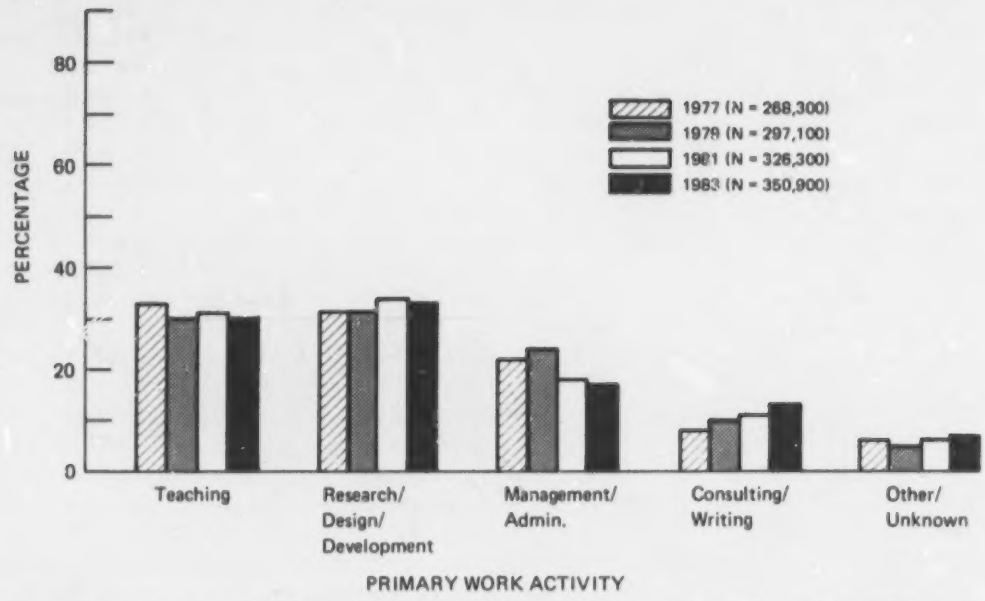

FIGURE 1-5 Distribution of employed doctoral scientists and engineers by primary work activity (excluding postdoctoral appointees), 1977, 1979, 1981, and 1983

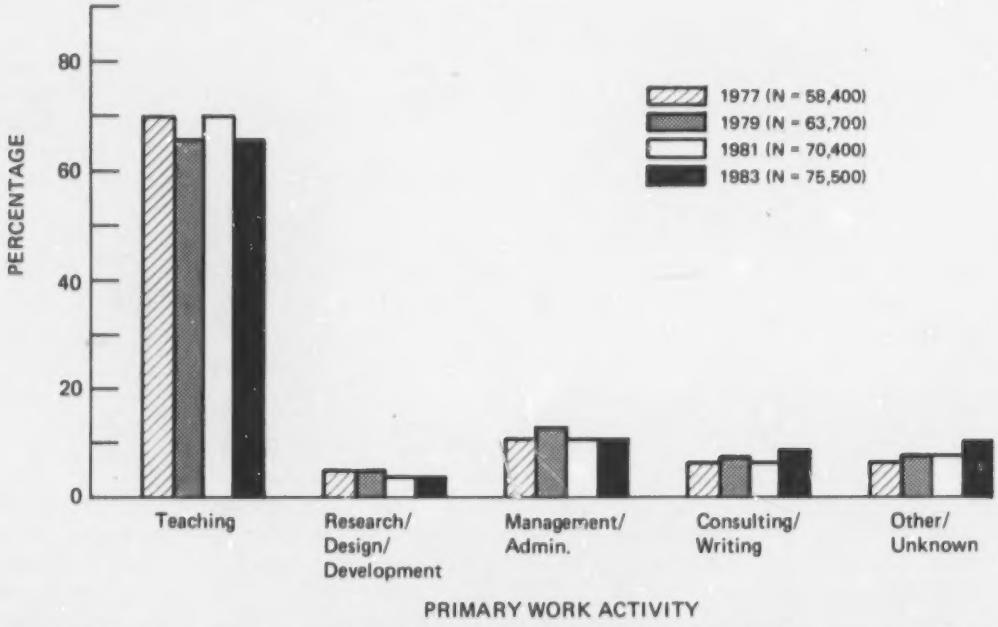

FIGURE 1-6 Distribution of employed humanists by primary work activity (excluding postdoctoral appointees), 1977, 1979, 1981, and 1983

the salary increase exceeds the increase in cost of living. This cost of living, measured by the Consumer Price Index (CPI-U), has risen by 128.0 percent since 1973 and by 11.4 percent since 1981.

- Among science/engineering fields, engineering Ph.D.s reported the highest median salary ($46,500) and psychology and social sciences Ph.D.s the lowest ($35,800 and $36,000, respectively). In the humanities, speech/theater Ph.D.s reported the highest median salary ($34,000) and music Ph.D.s the lowest ($28,900).
- Women generally earned lower salaries than men, and the gap generally widened with increases in years since receipt of the doctorate. Women with Ph.D.s in science/engineering reported salaries of $31,800; men, $40,900. Women with Ph.D.s in the humanities had a median annual salary of $26,800, compared to a median annual salary of $31,900 for men.
- Science/engineering doctorates employed by educational institutions earned less than doctorates in other sectors. Those employed by business/industry had the highest median salaries (approximately $47,200), and those employed by two-year colleges and elementary/secondary schools had the lowest ($31,900 and $31,300, respectively). In contrast, humanists employed by institutions of higher education earned more than those employed in other sectors. Humanities Ph.D.s working for 4-year colleges, universities, and medical schools reported the highest salary, $31,200, and those employed in elementary/secondary schools reported the lowest, $27,200.

Academic Employment Patterns

- Overall, the percentage of science/engineering Ph.D.s with academic rank of full professor in 1983 was greater for men than for women. In addition, only 39 percent of the women held tenured positions compared with 66 percent of the academically employed men. This margin of difference varied with age group.
- Similar results were found for humanists. Approximately 77 percent of the academically employed male humanities Ph.D.s held tenured positions compared to 51 percent of the women. This margin of difference also varied with age group.

Female Doctorates

- Women comprised about 14 percent of the science/engineering Ph.D. population, a 4 percentage point increase since 1977. Women were most highly represented in psychology (30 percent) and least represented in engineering (1 percent). Women comprised 29 percent of the Ph.D.s in the humanities, a 7 percentage point increase since 1977. They were most highly represented within art history (49 percent) and modern languages (42 percent) and least represented in philosophy (15 percent).

Minority Doctorates

- Roughly 11 percent of the science/engineering doctorates were members of racial/ethnic minority groups, with engineering having the largest percentage, 21 percent; roughly 90 percent of these engineering Ph.D.s were Asians, 7 percent were Hispanics, and 3 percent were Blacks. Psychology and earth/environmental sciences had the smallest percentages, 5 and 6 percent, respectively. The pattern for these three fields has remained the same since 1973.
- The overall percentage of racial/ethnic minority members with Ph.D.s in the humanities remained the same as it was in 1981 (6 percent).

I

INTRODUCTION AND OVERVIEW OF SURVEY METHODOLOGY

The Survey of Doctorate Recipients (SDR) was developed in 1973 to respond to the information needs of the federal government. Conducted on a biennial basis since that time, the survey provides statistical data describing the demographic and employment characteristics of individuals who hold doctorates in science, engineering, and (more recently) the humanities. The longitudinal nature of the survey--i.e., individual members of the sample are resurveyed every two years--also permits the tracking of the career progression and mobility of this population. The complete survey file, which contains information on participants from each biennial survey, includes, but is not limited to, Ph.D.s[2] in the sciences,[3] engineering, and humanities who have earned their degrees between 1930 and the present.

This report, based on the results of the sixth biennial survey, summarizes the demographic and employment characteristics of Ph.D.s who obtained their degrees between January 1940 and June 1982 and who were residing in the United States in February 1983. It deliberately limits itself to the presentation of a statistical profile of these doctorates. Little attempt is made to analyze the causal factors underlying the statistical patterns that emerge. The report highlights character-

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[2]Recipients of such doctorates as DSc, DA, and DAS are also included in the survey sample.

[3]Throughout this report the population of doctorate-holding scientists is defined to include those with doctorates in the natural and social sciences and mathematics. A detailed list of science fields appears as part of the survey questionnaire reproduced in Appendix B.

istics that have typically been of interest to policymakers and students of this population in the past.

Chapter II examines doctorates in the sciences and engineering, including the broad fields of mathematics, computer sciences, physics/astronomy, chemistry, earth/environmental sciences, engineering, life sciences (agricultural, medical, and biological), psychology, and social sciences. Chapter III examines Ph.D.s in the humanities fields of history, art history, music, speech/theater, philosophy, English and American language/literature, classical languages, modern languages, and "other" humanities.

Additional analyses of the 1983 survey data are planned. These include (1) a study of humanities Ph.D.s and their adjustments to changing market conditions and (2) a study of the impact of career discontinuities on employment and earnings.

The 1983 Sample

The 1983 roster of science, engineering, and humanities Ph.D.s contains data on 515,259 individuals who, as stated, earned doctorates between January 1940 and June 1982 and who are classified in one of the following groups:

Segment 1, those individuals who earned their doctoral degree in science, engineering, or the humanities. Foreign citizens who, at the time they received their degrees, indicated in the annual Survey of Earned Doctorates (SED) that they intended to leave the United States after receiving them are excluded.

Segment 2, those few individuals who earned their doctorates in education or professional fields but were known to have been subsequently employed as scientists or engineers according to the NSF's Register of Scientific Personnel (1968-1970), Engineer Register (1967-1969), or Employment Survey (1971).

Segment 3, individuals who earned their doctorates at foreign institutions and were known to be working in the United States as scientists or engineers according to a number of sources such as American Men and Women of Science, the NSF's National Register of Scientific and Technical Personnel, employment records of federal laboratories and selected large industrial companies, and catalogs of doctorate-granting colleges and universities.

It should be noted that Segments 2 and 3 have not been increased since 1972.

The sampling frame, explained further in Appendix C (page 121), was stratified to assure coverage of all significant subpopulations. The stratification variables were field of doctorate (or when Ph.D. field was not available, field of science/engineering employment), the year in which the doctoral degree was awarded, degree category (that is, segments 1, 2, and 3), sex, racial/ethnic group, and citizenship. Each stratum had a sampling rate that varied from 2 to 100 percent, so as to provide sufficiently large samples for small subgroups of the population. Within each stratum, a simple random sample was selected. The sample sizes for the stratification categories are given in Appendix D (page 127). The overall sampling rate, from the roster of 515,259 Ph.D.s, was 13.6 percent.

Survey Methodology

The survey sample included 69,865 individuals, of whom 2,405 were not surveyed because they were known to be deceased or out-of-scope (see Table F-1, page 140) prior to the survey. Thus, the surveyed sample consisted of 67,460 individuals. Addresses were located for approximately 90 percent of the survey sample from the following sources: Doctorate Records File, American Men and Women of Science, the National Faculty Directory, college and university catalogs, and responses from previous surveys, as well as many alumni offices, de-

partments of individuals' baccalaureate and doctoral institutions, and several professional societies.

The first mailing of the 1983 survey was conducted in May 1983, and the follow-up mailing to those who had not yet responded took place in July 1983. An abbreviated questionnaire was developed in the summer 1983 and mailed to remaining nonrespondents in September 1983. This special abbreviated questionnaire also listed prior responses given by the individuals. In November 1983 a postcard survey form was mailed to the remaining nonrespondents (see Appendix B, page 109, for a sample of all forms used for the 1983 survey).

Weighting of Responses

Responses are defined as the total number of (1) completed questionnaires returned by sample members and (2) questionnaires returned with an indication that the sample member was deceased. Information was collected on 44,277 of the 67,460 individuals in the survey sample, yielding a response rate of 66 percent.[4] The response rate, when calculated on the basis of those in the sample who were actually contacted (66,156), was 74 percent. The response was analyzed for bias; results testified to the overall representativeness of the sample (see Appendix G, page 141).

Population estimates were made by weighting the responses received. Individuals known to be deceased or out-of-scope prior to the survey were excluded from the survey and weighted by sample weights (i.e., the ratio of a stratum's population size to its sample size). The responses received from the survey sample (67,460) were weighted by the product of the weight for nonresponse and the sample weight. The weight for nonresponse is the ratio of the number of survey sample cases in the stratum to the number of responses in the stratum. The weighting procedure is explained further in Appendix F (page 139). The

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[4]See Appendix D for detailed response rates for the 1983 survey.

estimated population size using all responses (497,447) is higher than the sum of the population estimates in Chapters 2 and 3, since it includes responses received from individuals residing in foreign countries, those known to be deceased, and those with doctorates in education or professional fields--all of whom are out-of-scope for this report.

II

SCIENCE AND ENGINEERING DOCTORATES

Doctoral Population by Field of Degree and by Field of Employment

The distribution of the 1940-1982 doctoral scientists and engineers in the United States in 1983 by their field of Ph.D. is given in Table 2-1.[5] An estimated 387,300 were members of this population. Although the number of Ph.D.s in the sciences and engineering has grown since 1981, the rate of growth has decreased slightly, from approximately 10 percent between 1979 and 1981 to 8 percent between 1981 and 1983. The percentage distribution of doctorate recipients by field remains relatively unchanged from previous survey reports: biological sciences (69,500, or 17.9 percent), social sciences (60,000, or 15.5 percent), engineering (57,500, or 14.9 percent), psychology (51,300, or 13.3 percent), and chemistry (50,000, or 12.9 percent). Table 2-1 also describes the distribution of this population by employment status and field of employment. The fields in which the largest percentage of science/engineering Ph.D.s were employed in 1983 were essentially these

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[5]The Ph.D. fields analyzed in this chapter are mathematics, computer sciences, physics/astronomy, chemistry, earth/environmental sciences, engineering, agricultural sciences, medical sciences, biological sciences, psychology, and social sciences. These are the same broad fields examined in previous Profiles. However, selected subfields of social sciences (i.e., archeology, linguistics, history and philosophy of science) are also counted as humanities fields in Chapter III.

TABLE 2-1 Distribution of Doctoral Scientists and Engineers in the United States (1940-1982 Graduates) by Field of Doctorate and Field of Employment, 1983*

	Field of Doctorate		Field of Employment	
	N	%	N	%
All Fields (N)	387,300	100.0	387,300	100.0
Mathematics	19,600	5.1	13,700	3.5
Computer Sciences	2,600	0.7	10,700	2.8
Physics/Astronomy	30,300	7.8	19,400	5.0
Chemistry	50,000	12.9	34,200	8.8
Earth/Environmental Sci.	12,900	3.3	15,600	4.0
Engineering	57,500	14.9	56,000	14.5
Agricultural Sciences	18,900	4.9	15,600	4.0
Medical Sciences	14,700	3.8	21,600	5.6
Biological Sciences	69,500	17.9	53,000	13.7
[redacted]				
Psychology	51,300	13.3	39,700	10.3
[redacted]				
Social Sciences	60,000	15.5	40,300	10.4
Nonscience/ Nonengineering			23,600	6.1
No Rpt. on Employment Field			18,400	4.7
Not employed			21,900	5.7
No Rpt. on Employment Status			3,600	0.9

*Employment data presented here are not directly comparable to previous survey reports, as the employment figures are based on the total Ph.D. population while those of previous reports were based on only the employed population.
#Code 280 (biochemistry) from the broad field of chemistry has been merged with code 540 from the broad field biological sciences. The estimated number of Ph.D.s involved in this transfer is 3,600.

same fields: engineering (14.5 percent), biological sciences (13.7 percent), social sciences (10.4 percent), psychology (10.3 percent), and chemistry (8.8 percent).

Except for computer sciences, earth/environmental sciences, and medical sciences, the number of individuals employed in a particular field was less than the number with degrees in that field, and the difference observed suggests that a substantial number of science/engineering Ph.D.s are not employed in the field of their degree. One reason for this is that 6.1 percent (or 23,600) of the science/engi-

neering Ph.D.s are no longer employed in science/engineering. Another reason is that some Ph.D.s switched to other science/engineering fields that have similar skill requirements—e.g., mathematics Ph.D.s to employment in the computer sciences. Field mobility is described in more detail below.[6] A final reason is that an estimated 11.3 percent of these Ph.D.s either were not employed or failed to report field of employment.

Field Mobility of Employed Ph.D.s

In the context of this report, field mobility refers to the movement of individuals from a specified field of degree to a different field for employment. When market conditions are tight or there is a surplus of individuals in a given field, many highly trained people will secure employment outside their Ph.D. field. The measurement of field mobility is useful, then, since it gives an indication of the relative labor market demand and the adaptability of labor force entrants in response to it. Table 2-2 summarizes field mobility for employed science/engineering doctorates by field of degree.

Of the estimated 361,700 employed science and engineering Ph.D.s in the United States in February 1983, 6.5 percent were employed outside science and engineering. Within science/engineering fields, the greatest mobility generally occurs between fields that are closely related or have overlapping subject areas. Of the Ph.D.s in mathematics, for example, 11.5 percent were employed in computer sciences and another 6.0 percent in engineering. Substantial field mobility was also evident in the life sciences--i.e., agricultural, medical, and biological sciences.

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[6]Appendix H clarifies the fine field composition of the eleven broad science fields, along with estimated numbers of doctoral scientists and engineers employed in each fine field category, and field mobility is examined more extensively in Table 2-2.

TABLE 2-2 Field Mobility of Employed Doctoral Scientists and Engineers (1940-1982 Graduates), 1983 (in percent)

Field of Employment	Total Employed	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
All Fields	361,700	18,600	2,500	28,900	46,000	12,200	55,400	17,200	13,700	63,000	48,300	55,900
Mathematics	3.8		2.3	0.9	0.2	0.3	0.6	0.3	0.1	0.4	0.3	0.6
Computer Sciences	2.9	11.5		5.3	1.7	0.8	3.5	0.5	0.5	0.7	1.7	1.4
Physics/Astronomy	5.4	0.9			1.8	1.1	1.9	0.2	0.8	0.4		
Chemistry	9.5			0.7		1.3	0.8	1.2	1.8	2.1		0.1
Earth/Envir Sci	4.3	0.7		3.0	2.4		2.1	2.1	0.4	2.1		0.9
Engineering	15.5	6.0	9.9	18.1	7.3	4.1		1.5	0.6	0.8	0.7	0.4
Agricultural Sci	4.3	0.1		0.1	0.6	1.0	0.2		0.2	3.5		1.3
Medical Sciences	6.0	0.4		1.2	3.3	0.6	0.9	1.4		11.7	2.5	1.5
Biological Sci	14.7	2.3		0.8	4.8	1.9	0.5	11.9	16.2		2.0	0.3
Psychology	11.0	0.2	0.4						0.7	0.1		1.2
Social Sciences	11.1	1.1	0.5	0.6	0.3	0.3	0.2	2.8	1.1	0.2	1.9	
Nonscience/ Nonengineering	6.5	4.9	1.7	5.0	4.2	3.1	4.5	4.4	4.1	3.7	6.0	17.4
No Report	5.1	6.4	5.3	6.2	4.7	3.6	5.1	3.9	4.0	4.1	4.2	7.1

NOTE: Includes postdoctoral appointees as well as full-time and part-time employed doctorates.

In contrast to outflow, the employment fields retaining the highest percentage of their doctorate recipients were earth/environmental sciences (82.0 percent), psychology (80.5 percent), computer sciences (79.9 percent), and engineering (79.6 percent). The field retaining the lowest percentage of its Ph.D.s was physics/astronomy (57.9 percent); a substantial portion of these doctorates moved to the field of engineering for employment. This should not be too surprising, given the close interrelationship of these two disciplines. (It is also reflected in the substantial flow of Ph.D. chemists into engineering employment.) This mobility from the physical sciences to engineering employment may reflect a relatively better job outlook in the latter field. The largest amount of nonscience/nonengineering employment was found in the social sciences (17.4 percent). Computer sciences, on the other hand, had the lowest relative outflow (1.7 percent).

Demographic Characteristics by Field of Doctorate

The demographic characteristics summarized below have been and continue to be of interest to policy makers. The distributions by gender and racial/ethnic group have been used to illuminate the issue of underrepresentation. The age characteristics can be used to shed light on the "young investigator" issue and the related topic of the continuity and vitality of our human resource base in science and technology. The citizenship characteristics have been examined in the context of foreign doctorates and their role in graduate education and the labor force in their countries, an issue which has been one of continuing concern to policy makers.

Sex

Women's share of science/engineering Ph.D.s has continued to increase steadily over the past several years from 11.2 percent in 1979 to 13.6 percent in 1983 (Table 2-3). This growth rate, however, was less than

TABLE 2-3 Demographic Characteristics of Doctoral Scientists and

Demographic Characteristics	All Fields	Field of Doctorate Math	Comp Sci	Phys/ Astrn	Chem
Total Population (N)	387,300	19,600	2,600	30,300	50,000
Sex					
Male	86.4	91.2	91.0	96.7	92.1
Female	13.6	8.8	9.0	3.3	7.9
Racial/Ethnic Group					
White	87.9	87.9	89.6	88.5	87.2
Minority Group	10.8	10.3	9.4	9.8	11.6
Hispanic	1.4	1.4	0.7	1.0	1.6
Black	1.3	0.9	0.4	1.0	1.0
Asian	7.9	7.9	8.1	7.6	9.0
American Indian	0.1	0.1	0.2	0.1	0.1
Other			0.1		
No Report	1.3	1.8	0.9	1.7	1.2
Age in 1983					
Under 30	1.8	2.0	5.9	1.7	2.4
30-34	12.7	12.5	24.7	10.2	11.4
35-39	20.0	20.7	34.8	17.9	16.1
40-44	20.9	24.2	23.9	23.6	20.2
45-49	13.4	14.4	6.7	16.2	13.2
50-54	10.3	9.0	2.6	10.1	12.4
55-59	8.4	7.4	0.9	9.1	8.0
60-64	6.4	4.4	0.5	6.4	8.5
Over 64	6.0	5.3		4.7	7.5
No Report	0.1				0.1
Median Age (Years)	43	43	37	44	44
Calendar Year of Ph.D.					
1940-1949	4.5	5.0		4.8	9.7
1950-1959	13.1	10.2	0.4	15.9	18.5
1960-1969	26.7	32.1	6.6	32.4	30.4
1970-1974	23.1	24.8	31.7	22.5	19.0
1975-1979	21.4	19.6	39.3	17.0	14.8
1980-1982*	11.2	8.2	22.0	7.3	7.5
Citizenship					
U.S.	94.3	93.9	89.0	92.2	94.8
Native	84.3	82.2	81.2	81.1	82.4
Naturalized	9.6	11.5	7.8	11.0	11.9
Unspecified	0.4	0.1		0.2	0.1
Non-U.S.	5.7	6.1	11.0	7.8	5.2
No Report					

*Excludes Ph.D.s awarded in July-December, 1982.

Engineers by Field of Doctorate, 1983 (in percent)*

Field of Doctorate						
Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
12,900	57,500	18,900	14,700	69,500	51,300	60,000
94.1	98.7	95.5	77.3	80.0	70.1	81.6
5.9	1.3	4.5	22.7	20.0	29.9	18.4
93.0	78.2	89.2	86.9	89.6	93.5	89.0
6.1	20.5	9.4	11.7	9.0	5.2	9.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3	0.6	0.7	1.8	1.2	2.0	2.5
4.8	18.3	6.6	7.7	6.6	1.4	5.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		0.1		0.1		0.1
0.9	1.2	1.2	1.5	1.3	1.3	1.5
1.0	1.7	1.1	1.9	1.9	2.0	1.1
14.1	10.6	11.3	14.6	14.9	16.8	10.5
20.2	19.9	16.2	19.8	20.8	24.1	20.2
18.9	23.0	19.7	19.9	19.6	17.8	21.9
15.3	17.6	12.8	13.1	11.9	11.7	11.4
12.2	10.6	11.6	10.8	9.2	9.0	10.5
5.7	7.5	9.9	8.7	9.2	8.5	9.2
6.7	5.5	9.4	4.9	5.9	5.5	6.8
5.9	3.6	7.9	6.2	6.7	4.6	8.1
	0.1		0.1		0.1	0.2
43	43	45	43	43	42	44
5.0	2.6	4.7	3.7	5.3	1.9	3.5
10.1	10.4	17.2	10.5	14.2	11.9	11.0
27.2	32.0	26.9	20.7	25.3	21.2	22.4
22.6	26.3	21.2	22.9	22.3	21.8	25.5
23.2	18.4	18.8	25.7	21.6	28.2	25.1
11.8	10.3	11.1	16.5	11.3	15.0	12.5
94.0	88.8	95.0	94.9	96.0	98.5	94.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8.0	16.3	6.4	9.2	8.2	4.2	7.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5.9	11.2	5.0	5.1	3.9	1.4	5.3
				0.1	0.1	0.1

the rate for women with 16 or more years of school completed, according to data for 1983 from the U.S. Census Bureau. The percentage of women who had completed 16+ years of school increased respectively, from 12.5 percent to 17.6 percent.

The increase in the female share was noted in all science/engineering fields, with the greatest increase occurring in the medical sciences (22.7 percent in 1983 compared to 17.3 percent in 1981). The fields of engineering and physics/astronomy continue to have the smallest percentage of women (1.3 percent and 3.3 percent, respectively) while the fields of psychology, biological sciences, and social sciences continue to have relatively high proportions of women (29.9 percent, 20.0 percent, and 18.4 percent, respectively).

Minorities

The 1983 data show little change in the percentage who classified themselves as members of a minority group (Hispanic, Black, Asian, American Indian) or as non-minority (White). However, it should be noted that percentages reported here are not directly comparable to those of previous surveys.[7]

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[7]The racial/ethnic data have been corrected for inconsistency in responding to this item. In previous surveys, Ph.D.s who responded to the race/ethnic question with more than one response were generally coded into the minority group. Prior to publication of the 1983 data, these survey forms were examined closely to determine if previous survey responses could resolve these multiple codes more satisfactorily. Any individual who had given an inconsistent response or more than one response to the race/ethnic question in previous surveys was reclassified into the racial/ethnic group that he or she had given the most frequently. Those survey respondents who consistently reported multiple responses to this item were classified as "other" minority in the 1983 report (N = 178, or less than 0.1 percent of the total population). It is because of this review and subsequent recoding that the percentage of American Indians is less than that reported in the 1981 Profile.

In 1983, minorities, most of whom were Asians (7.9 percent), comprised approximately 11 percent of the science/engineering doctoral population. Hispanics, who in 1983 comprised 7.1 percent of the population with 16+ years of school completed, comprised only 1.4 percent of the Ph.D. population. Similarly, Blacks, 8.8 percent of the population with 16+ years of school completed, comprised only 1.3 percent of the Ph.D. population. American Indians had the smallest representation, only 0.1 percent of the doctoral population.

By field, the largest share of minority Ph.D.s was in engineering (20.5 percent), with 18.3 percent being Asians. The lowest percentages were found in psychology and earth/environmental sciences (5.2 percent and 6.1 percent, respectively). Blacks were most heavily represented in the social science fields (2.5 percent) and least heavily represented in earth/environmental science fields (0.3 percent). This pattern is consistent with previous survey results.

Age

Across all fields, one-fifth or more of the Ph.D.s were in the 40-44 age category. More than 50 percent of those in the 1983 science/engineering Ph.D. population were between the ages of 30 and 45. For the rapidly growing field of computer sciences, whose doctorate recipients had a median age of 37, as many as 89.3 percent were under 45 years of age. In three fields more than one-third of the doctorates were at least 50 years old: agricultural sciences (38.8 percent), chemistry (36.4 percent), and social sciences (34.6 percent). Of these, the agricultural sciences had the highest concentration of older Ph.D.s.

Year of Degree

Relative growth patterns can be seen from an examination of the percentage of Ph.D.s earning their degrees in various time periods. For example, the 1960s, when approximately 26.7 percent of all science/engineering Ph.D.s were earned, were productive years for Ph.D.s in

the physical sciences, mathematics, and engineering. The fields of computer sciences, medical sciences, psychology, and social sciences, however, had higher percentages of graduates earning their degrees in the 1970s.

Foreign Citizens

The highest percentages of foreign citizens were in engineering and computer sciences (11 percent each); the lowest percentage was in psychology (1.4 percent). This finding is similar to that reported in previous Profiles. It should be noted, however, that the percentage of science/engineering Ph.D.s who are foreign citizens may be somewhat underestimated in this report because of the absence of a comprehensive sampling frame from which to draw a sample of foreign-earned Ph.D.s who are working in the United States.

Labor Force Status by Field of Doctorate

Labor force participation rates--i.e., the fraction of the population that is either employed or seeking work--provide useful information on the "supply" of these highly-trained human resources--i.e., the extent to which they are actively involved in the labor market. In addition, the complement of this rate--i.e., the nonparticipation rate--can provide useful clues regarding possible underutilization of these resources, particularly those who are discouraged from seeking work because they do not think jobs are available.

Most members of this doctorate population are actively involved in the labor force. Only 4.7 percent of this population are not in the labor force (Table 2-4).[8] Over three-quarters of the Ph.D.s who were

[8]The population base includes 0.9 percent who did not report employment status. Since some of these are likely not to be in the labor force, the 4.7 percent estimate understates the rate of nonparticipation slightly.

TABLE 2-4 Labor Force Status of Doctoral Scientists and Engineers (1940-1982 Graduates) by Field of Ph.D., 1983 (in percent)

Labor Force Status	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	387,300	19,600	2,600	30,300	50,000	12,900	57,500	18,900	14,700	69,500	51,300	60,000
In Labor Force	94.3	95.4	97.9	96.1	93.1	95.8	96.8	92.0	93.7	92.2	95.0	94.3
Not In Labor Force	4.7	3.8	1.4	2.9	6.0	3.2	2.4	6.9	5.0	6.9	3.8	5.0
Not Seeking Employment	0.9	0.7	0.2	0.5	0.7	0.3	0.3	0.4	1.5	2.0	1.1	0.9
Retired	3.6	3.0	0.1	2.2	5.2	2.8	2.1	6.4	3.4	4.6	2.3	3.9
Other	0.2	0.1	1.1	0.2	0.1	0.1		0.1	0.1	0.3	0.4	0.2
No Report	0.9	0.9	0.8	1.0	0.9	0.9	0.8	1.1	1.3	0.9	1.2	0.8

classified as being out of the labor force were retired. The rate of nonparticipation varied by field from a low of 1.3 percent in computer sciences to a high of almost 7 percent in agricultural sciences and biology.

Data limitations make it difficult to estimate the number of science/engineering doctorates who are not in the labor force because they are discouraged from seeking work by perceived gloomy job prospects. It is likely, however, that given the relatively favorable labor market conditions that seem to exist for these doctorates,[9] the number experiencing this type of discouragement will be small. Evidence in support of this hypothesis can be gleened from Table 2-4 by noting the small percentage who were not in the labor force and not seeking employment--0.9 percent averaged over all fields, ranging from a low of 0.2 percent in computer sciences to a high of 2 percent in biology. Since only a fraction of these Ph.D.s may be discouraged, this represents a crude upper bound in the actual amount of this type of underutilization.

Employment Status

Given participation in the labor force, information on the employment status of these Ph.D.s provides a more enriched appreciation of their utilization and the degree to which they might be underutilized. A number of indicators of underutilization can be generated from the data summarized in Table 2-5. The unemployment rate--the percent of those in the labor force who are not employed but seeking work--is a standard, commonly-accepted indicator of excess supply. The complement, however, (i.e., the employment rate) can mask a considerable amount of underutilization. Table 2-5, therefore, also highlights two groups of employed but potentially underutilized resources:

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[9]As noted in Table 2-5, the unemployment rates averaged over all fields for these Ph.D.s was only 1.0 percent in 1983.

those working part-time but seeking full-time employment and those involuntarily employed in nonscience or nonengineering jobs because they cannot find science or engineering jobs. Because of data limitations, however, the indicator of the latter type of underutilization presented in Table 2-5--i.e., the percent employed in nonscience/nonengineering--also includes those who have voluntarily opted for this type of employment. It overstates, therefore, the amount of underutilization represented by involuntary employment in nonscience/nonengineering jobs.

As mentioned earlier, 365,400 (or 94.3 percent) of doctoral scientists and engineers were in the labor force in February 1983. During the survey years the labor force participation rate has fluctuated between 0.1 and 1.4 percentage points with no distinct trend apparent.[10]

Table 2-5 includes the data on the employment status of doctoral scientists and engineers by sex and field of doctorate. Approximately 1 percent of this total labor force was unemployed (i.e., not employed but seeking work). Although unemployment figures have actually changed very little, the 1983 figure is slightly higher than that in 1981 (0.8 percent) and marks a break in the trend downward from the 1973 rate (1.2 percent). This reversal in trend coincides with the sharp downturn in economic activity that occurred between February 1981 and February 1983, when unemployment rates for the total labor force rose from 7.3 percent to 10.2 percent.

By Sex

The unemployment rate for women in 1983 exceeded that of men (2.6 percent compared to 0.8 percent). Further comparisons show that the unemployment rate for women was higher than that for men in all fields but mathematics (where 0.4 percent of the women and 0.6 percent of the

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[10]Previous labor force percentages were as follows: 93.7 percent in 1973; 95.1 in 1975; 94.7 in 1977; 95.2 in 1979; and 95.1 in 1981.

TABLE 2-5 Employment and Unemployment of Doctoral Scientists and

Labor Force Status/Sex	All Fields	Field of Doctorate Math	Comp Sci	Phys/ Astrn
TOTAL Ph.D. Labor Force* (N)	365,400	18,700	2,500	29,100
Employed Full-Time	91.7	96.1	98.6	94.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Employed Part-Time	4.4	2.6	1.3	2.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	3.0	0.7	0.1	3.0
Unemployed and Seeking Employ	1.0	0.6		0.7
Ph.D. Labor Force,* Male (N)	317,000	17,100	2,300	28,200
Employed Full-Time	93.7	96.8	99.2	94.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Employed Part-Time	3.1	1.9	0.8	1.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	2.5	0.7		2.9
Unemployed and Seeking Employ	0.8	0.6		0.7
Ph.D. Labor Force,* Female (N)	48,400	1,600	200	900
Employed Full-Time	78.6	88.7	92.9	82.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Employed Part-Time	12.5	10.3	6.3	10.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	6.3	0.5	0.9	5.1
Unemployed and Seeking Employ	2.6	0.4		1.7

*As part-time and postdoctoral appointment rates outside science/ combined, the respective rates for nonscience/nonengineering part-time labor force--0.4 percent and less than 0.1 percent; male labor force--1.2 percent and less than 0.1 percent.
**Includes full-time and part-time employed, postdoctoral appointees,

Engineers in the U.S. Labor Force by Sex and Field of Ph.D., 1983

Field of Doctorate							
Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
46,600	12,300	55,600	17,400	13,800	64,000	48,800	56,500
93.3	92.8	96.2	94.9	89.1	86.2	87.5	91.9
(4.0)	(2.8)	(4.4)	(4.3)	(3.7)	(3.2)	(5.3)	(15.9)
3.1	4.4	2.7	2.1	4.3	3.8	9.8	5.5
0.6	0.6	0.9	0.2	0.6	0.9	1.9	1.4
2.6	3.6	1.8	1.9	3.4	2.9	7.9	4.1
2.4	1.9	0.6	2.1	5.8	8.5	1.6	1.5
1.2	0.8	0.5	0.8	0.8	1.5	1.1	1.2
43,000	11,600	55,000	16,600	10,700	51,700	34,500	46,400
94.2	93.9	96.3	95.7	91.4	89.4	91.9	93.8
(3.3)	(2.6)	(4.4)	(4.3)	(3.6)	(3.2)	(5.1)	(16.0)
2.7	3.8	2.7	1.8	2.8	2.5	5.8	4.3
0.5	0.6	0.9	0.2	.5	0.6	1.2	0.8
2.2	3.2	1.8	1.7	2.3	2.0	4.6	3.5
2.0	1.7	0.6	1.8	5.1	7.0	1.3	1.2
1.1	0.6	0.5	0.7	0.7	1.0	0.9	0.6
3,600	700	700	700	3,100	12,400	14,300	10,200
81.7	75.8	90.3	79.1	81.4	73.0	76.8	83.1
(5.1)	(3.7)	(2.5)	(4.4)	(4.2)	(3.2)	(5.8)	(15.3)
8.9	14.2	4.3	7.4	9.4	8.9	19.4	10.9
1.9	2.8	0.9	1.7	2.0	2.0	3.4	4.2
7.1	11.4	3.4	5.7	7.4	6.9	16.0	6.7
6.7	6.3	3.3	9.0	8.1	14.5	2.2	2.5
2.7	3.8	2.0	4.5	1.2	3.6	1.5	3.6

engineering were so small, they were not illustrated. For all fields employment and postdoctoral appointments were as follows: total 0.3 percent and less than 0.1 percent; and total female labor force--

and those unemployed but seeking employment.

men were unemployed) and computer sciences (where no unemployment was reported for either group). The largest differences in unemployment rates occurred in the agricultural sciences (4.5 percent for women and 0.7 percent for men), earth/environmental sciences (3.8 percent for women and 0.6 percent for men), and social sciences (3.6 percent for women and 0.6 percent for men).

Women were more likely to be employed part-time. This was true for each field, but the magnitude of the difference varied from field to field. Of the total female labor force (48,400), 12.5 percent were employed part-time. In comparison, 3.1 percent of the 317,000 male Ph.D.s in the 1983 labor force were employed part-time. The majority of both men and women employed part-time, however, were not seeking full-time employment. In addition, women who were employed full-time were more likely to be employed in nonscience/nonengineering fields. For most fields, greater percentages of women than men held postdoctoral appointments, the only exception being in the field of mathematics where 0.4 percent of the women and 0.7 percent of the men were postdoctoral appointees in 1983. The largest percentage differences by field occurred in the biological sciences (14.5 percent for women and 7.0 percent for men) and in the agricultural sciences (9.0 percent for women and 1.8 percent for men).

By Field of Doctorate

Examining the labor force by field shows that computer sciences had the best record: this field had the highest rate of full-time employment, 98.6 percent; the lowest rate of part-time employment, 1.3 percent (and, of those, none were seeking full-time jobs); and no unemployment. These figures indicate a slight improvement since 1981, when 97.2 percent of the computer science Ph.D.s were employed full-time, 1.4 percent were employed part-time, and 0.2 percent were unemployed. In contrast, the data for all other fields either showed a slight decrease or no change in the percentage who were employed full-time.

Ph.D.s in biological sciences reported the lowest rate of full-time employment (86.2 percent) and the highest rate of unemployment (1.5 percent).

Geographic Differences

Distribution of Ph.D. Population

The distribution of science/engineering Ph.D.s in the U.S. by region[11] is shown in Figure 2-1. A total of 44.3 percent of all the science/engineering Ph.D.s are located on the East Coast. In comparison, this area contains only 37.7 percent of the nation's population. This is not surprising, however, due to the concentration of industry as well as colleges and universities in this geographical area. The largest percentages are located in the Middle and South Atlantic regions--18.8 percent (72,500) and 17.9 percent (69,200), respectively--the two most highly populated areas in the country, according to U.S. Census Bureau estimates for 1983. These percentages, compared with the somewhat lower 1983 population percentages of 15.8 percent and 16.6 percent, respectively, indicate a slight concentration of Ph.D.s in these areas. In contrast, the lowest percentage of Ph.D.s, 4.2 percent (16,000), was found in the East South Central region, which has a slightly higher population figure of 6.4 percent.

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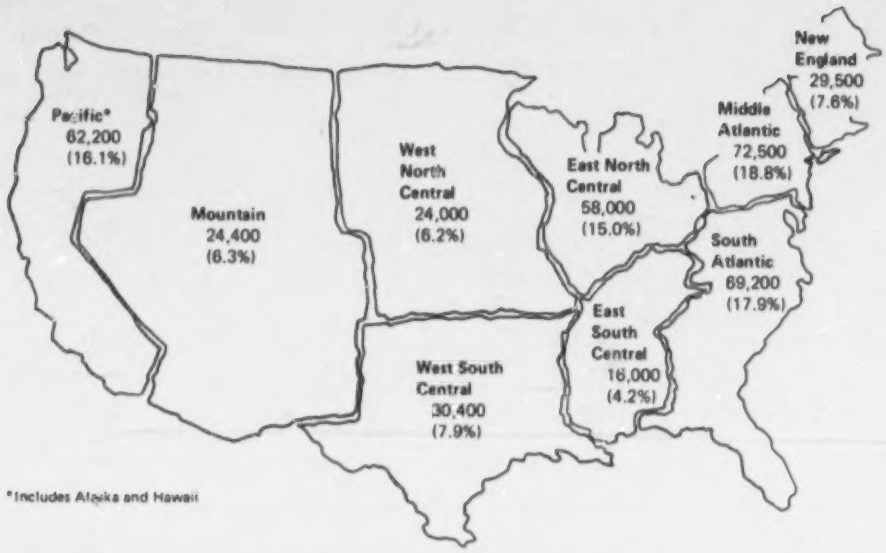
[11]Regions by state are as follows: New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic (New Jersey, New York, Pennsylvania); East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota); South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia); East South Central (Kentucky, Alabama, Mississippi, Tennessee); West South Central (Arkansas, Louisiana, Oklahoma, Texas); Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming); Pacific (Alaska, California, Hawaii, Oregon, Washington).



NOTE: By region, Census Bureau estimates for the total U.S. population in 1983 are broken down as follows: New England, 5.3 percent; Middle Atlantic, 15.8 percent; East North Central, 17.7 percent; West North Central, 7.4 percent; South Atlantic, 16.6 percent; East South Central, 6.4 percent; West South Central, 11.0 percent; Mountain, 5.3 percent; and Pacific, 14.4 percent.

FIGURE 2-1 Regional distribution of U.S. doctoral scientists and engineers, 1983 (estimated population of 1940-1982 science/engineering Ph.D.s in the U.S. = 386,200 excluding 1,100 in U.S. possessions)

Employment Status

In terms of employment status, Ph.D.s in the East South Central states had the highest rate of full-time employment, 95.3 percent, while those in the Pacific and New England states had the lowest rates, 88.1 percent and 88.8 percent, respectively (Table 2-6). These same three regions reversed their ranking with regard to part-time employment: the Pacific and New England states were highest with respective percentages of 7.3 and 5.0, while the East South Central region was lowest with only 1.9 percent.

Postdoctoral appointments were highest in the New England states, 5.1 percent, and lowest in the East North Central and East South Central regions, 2.3 percent in each of these geographical areas.

Unemployment was highest, 1.6 percent, in the Middle Atlantic states (the region with the greatest Ph.D. concentration) and lowest, 0.5 percent, in the East South Central region (the area with the smallest Ph.D. concentration).

Type of Employer by Field of Doctorate

Total Ph.D. Population

Excluding Ph.D.s who were on postdoctoral appointments, an estimated 350,900 Ph.D.s in science and engineering in the United States in 1983 were employed either full-time or part-time. Table 2-7 shows the distribution of these Ph.D.s by type of employer while Appendix A (page 95) presents comparable longitudinal data.

Approximately 52.2 percent of this group were employed by educational institutions in 1983, and 50.0 percent of them were working in 4-year colleges/universities/medical schools. Almost one-third (31.7 percent) were employed by business/industry (including self-employed), and another 7.6 percent were employed by the U.S. government. The distribution has changed since 1981, when a larger percentage were employed in academe (53.4 percent) and a smaller proportion were in business/industry (29.8 percent). The shift represents the continuation of an earlier trend.

Academe continues to be the principal employer of doctorates in all but three fields. Business/industry was the principal employer for Ph.D.s in computer sciences (47.7 percent), chemistry (57.3 percent), and engineering (54.2 percent) and the second largest employer for all other fields. For all fields but psychology, the federal government was third, employing between 4.2 percent (computer sciences) and 17.9 percent (earth/environmental sciences) of these Ph.D.s. In psychology, the proportion of federally employed Ph.D.s was only 3.7 percent compared to the 12.7 percent employed in hospitals/clinics.

TABLE 2-6 Employment and Unemployment of Doctoral Scientists and

Labor Force Status	1983 Location (Region) All Regions	New England	Middle Atlantic	East North Central
Total Ph.D. Labor Force*	365,400	27,900	68,500	55,300
Employed Full-Time	91.7	88.8	91.3	93.3
Employed Part-Time	4.4	5.0	4.6	3.5
Seeking Full-Time Empl.	1.0	1.1	0.9	0.7
Not Seeking F-T Empl./On Post	3.4	3.8	3.7	2.8
Postdoctoral Appointment	3.0	5.1	2.5	2.3
Unemployed and Seeking Employ	1.0	1.1	1.6	0.9

+Regions by state are as follows: New England (Connecticut, Maine, (New Jersey, New York, Pennsylvania); East North Central (Illinois, Minnesota, Missouri, North Dakota, Nebraska, South Dakota); South North Carolina, South Carolina, Virginia, West Virginia); East South (Arkansas, Louisiana, Oklahoma, Texas); Mountain (Arizona, Colorado, California, Hawaii, Oregon, Washington).

*Includes full-time and part-time employed, postdoctoral appointees,

Recent Graduates

Changes in employer demand typically affect hiring rates. Thus, analysis of employment opportunities for recent graduates gives an early indication of sectoral shifts that might be occurring in the market. The percentage of employed recent Ph.D.s (1977-1982) working in academe (47.8 percent) was somewhat lower than that of all employed Ph.D.s (52.2 percent): the percentage employed by business/industry (34.1 percent) was slightly higher than it was for the total (31.7 percent). This disparity between all Ph.D.s and recent Ph.D.s was most evident for Ph.D.s in chemistry, where almost three-fourths (73.6 percent) of the recent graduates reported working in business/industry compared to only 18.4 percent employed by academe (Table 2-8).

Of recent Ph.D.s employed by the federal government, the highest percentages were in the fields of physics/astronomy and earth/environmental sciences (13.2 percent and 14.8 percent, respectively). Of

Engineers in the U.S. Labor Force by Region,* 1983 (in percent)

1983 Location (Region)						
West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	U.S. Possessions
22,700	64,600	15,100	29,000	22,700	58,500	1,100
92.3	93.3	95.3	93.5	91.3	88.1	92.8
3.3	3.2	1.9	3.4	4.8	7.3	5.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.5	2.7	2.3	2.5	3.0	3.6	1.6
0.9	0.8	0.5	0.6	0.9	1.0	0.4

Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, Central (Kentucky, Alabama, Mississippi, Tennessee); West South Central Idaho, Montana, New Mexico, Nevada, Utah, Wyoming); Pacific (Alaska,

and those unemployed and seeking employment.

those employed by non-profit organizations, the highest percentage was also in the field of physics/astronomy (5.7 percent), while hospitals/clinics employed a large number of recent psychology Ph.D.s (16.4 percent).

Primary Work Activity by Field of Doctorate

Total Ph.D. Population

The distribution of science/engineering Ph.D.s among the various work activities gives an indication of how their specialized training is being utilized and reflects the relative emphases placed on these activities in the labor market. This distribution of employed science and engineering Ph.D.s in 1983, described in Table 2-9, is summarized on page 39.

TABLE 2-7 Type of Employer of Doctoral Scientists and Engineers (1940-1982 Graduates) by Field of Ph.D., 1983 (in percent)

Type of Employer	Field of Doctorate											
	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population* (N)	350,900	18,500	2,500	28,100	44,900	12,000	55,000	16,900	12,900	57,600	47,500	55,000
Educational Inst.	52.2	73.0	46.5	47.5	32.6	45.4	34.9	57.8	56.5	64.1	47.1	71.8
4-Year Coll/Univ												
Med School												
2-Year College	1.4	1.3	0.1	0.8	1.9	0.8	0.1	0.7	0.6	2.3	1.8	2.1
[illegible]												
Business/Industry+	31.7	19.2	47.7	36.3	57.3	30.0	54.2	22.4	24.2	18.0	27.5	12.8
U.S. Government	7.6	5.1	4.2	10.8	5.8	17.9	7.1	14.0	7.3	8.7	3.7	7.2
State/Local Gov't	2.0	0.2	0.1	0.3	0.7	3.3	0.6	2.5	2.8	2.1	4.7	3.0
Hospital/Clinic	2.8	0.3		0.9	0.9	0.1	0.2	0.2	5.8	3.2	12.7	0.4
Other Non-Profit Organization	3.1	1.8	1.4	4.1	2.2	2.9	2.6	2.2	3.1	3.6	4.1	3.3
Other	0.3					0.1	0.1	0.5	0.1	0.2		1.3
No Report	0.2	0.4	0.1	0.2	0.3	0.4	0.2	0.4	0.4	0.2	0.2	0.2

*Includes full-time and part-time employed only.
+Includes self-employed.

TABLE 2-8 Type of Employer of Doctoral Scientists and Engineers (1977-1982 Graduates) by Field of Ph.D., 1983 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population* (N)	80,800	3,600	1,200	4,300	7,000	3,000	11,500	3,800	3,800	11,100	15,900	15,600
Educational Inst.	47.8	70.7	51.8	35.7	18.4	42.8	32.1	55.7	55.3	59.2	42.3	64.8
4-Year Coll/Univ/ Med School	44.5	67.3	51.8	34.3	17.7	41.6	32.1	55.1	53.7	56.2	34.2	60.5
2-Year College	1.7	2.1		1.4	0.6	1.2		0.6	1.1	2.5	1.8	3.2
[illegible]	1.6	1.3			0.1				0.5	0.4	6.2	1.1
Business/Industry+	34.1	21.6	44.3	44.0	73.6	35.3	57.2	29.1	23.2	22.8	27.2	17.1
U.S. Government	6.6	5.8	3.0	13.2	3.8	14.8	5.8	8.6	7.8	7.7	3.2	7.8
State/Local Gov't	3.1	0.1			0.9	3.5	1.0	2.3	2.2	2.7	6.1	4.9
Hospital/Clinic	4.3	0.8		0.9	1.1		0.5		7.3	3.0	16.4	0.6
Other Non-Profit Organization	3.7	1.1	0.9	5.7	2.2	3.0	3.4	2.5	3.7	4.5	4.4	4.3
Other	0.1					0.4		0.9				0.4
No Report	0.2			0.6		0.2		0.9	0.4	0.2	0.4	0.2

*Includes full-time and part-time employed only.
+Includes self-employed.

TABLE 2-9 Primary Work Activity of Employed Doctoral Scientists and Engineers (1940-1982 Graduates) by Field of Ph.D., 1983 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population* (N)	350,900	18,500	2,500	21,100	44,900	12,000	55,000	16,900	12,900	57,600	47,500	55,000
Teaching	29.8	52.4	27.0	21.7	19.3	26.6	20.8	20.2	24.9	28.4	26.1	53.2
Research/Dvlp/Design	32.7	25.1	48.8	48.5	42.5	41.7	38.7	41.7	31.7	42.3	13.3	14.9
Management/Admin	17.3	11.5	15.4	17.7	21.9	15.3	24.6	18.7	19.4	13.3	13.0	15.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Consulting/Prof. Svcs	10.6	5.0	5.4	3.2	4.2	6.8	7.6	6.4	14.6	6.1	40.5	4.7
Writing/Editing	2.1	0.6	0.8	1.5	1.9	2.5	1.2	1.9	1.9	1.6	2.3	4.2
Mktg/Oper/Insp	3.3	1.5	1.8	3.1	6.2	3.2	4.5	4.5	3.1	3.3	1.6	2.0
Other	2.1	0.8	0.1	1.5	2.2	2.4	1.4	4.2	2.2	2.2	1.8	2.9
No Report	2.1	3.2	0.7	2.6	1.8	1.6	1.2	2.5	2.3	2.8	1.4	2.4

*Includes full-time and part-time employed only.

- 32.7 percent reported research/development/design as their primary work activity. Although down from the 33.6 percent reported in 1981, this figure represents an overall increase from the 29.0 percent reported in 1973.
- 29.8 percent of Ph.D.s reported teaching as their primary work activity, down from the 37.0 percent reported in 1973.
- 17.3 percent of the doctorates were primarily engaged in management/administration, down from the peak of 23.8 percent in 1979 and the 18.3 percent reported in 1973.
- 10.6 percent were engaged in consulting/professional services, up from the 1973 figure of 5.1 percent.
- A fairly small percentage were engaged in writing/editing and market/operations/inspection (2.1 percent and 3.3 percent, respectively).

Research/development/design was the most frequently reported activity in eight of the eleven science/engineering fields. The percentages ranged from 31.7 percent in medical sciences to 48.8 percent in computer science. In the remaining three fields, the major employment activities were teaching (53.2 percent of the social scientists and 52.4 percent of the mathematicians) and consulting or professional services (40.5 percent of the psychologists).

Recent Ph.D.s

Like all science/engineering Ph.D.s, recent graduates (1977-1982) were most likely to report research/development/design (41.2 percent) as their primary work activity, followed by teaching (26.6 percent). However, it should be noted that for recent Ph.D.s, the proportion engaged in research/development/design was nearly 9 percentage points higher than for all Ph.D.s (Table 2-10). The percentage point difference was much higher for recent chemistry and physics/astronomy Ph.D.s--33.1 and 25.0 percentage points, respectively. Conversely, smaller percentages of recent graduates in all fields except computer sciences and medical sciences were engaged primarily in teaching; again, the largest difference was found for recent graduates in chemistry and physics/astronomy.

In addition, recent graduates appeared more likely to be primarily involved in consulting and in providing professional services than

TABLE 2-10 Primary Work Activity of Employed Doctoral Scientists and Engineers (1977-1982 Graduates) by Field of Ph.D., 1983 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population* (N)	80,800	3,600	1,200	4,300	7,000	3,000	11,500	3,800	3,800	11,100	15,900	15,600
Teaching	26.6	50.7	28.3	12.8	8.0	22.0	19.8	20.1	25.1	23.9	19.4	50.0
Research/Dvlp/Design	41.2	34.7	58.8	73.5	75.6	55.0	55.0	50.5	40.8	54.6	14.2	19.9
Management/Admin	9.0	5.4	5.9	6.8	5.9	7.0	11.5	10.3	10.9	6.5	8.2	12.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Consulting/Prof. Svcs	14.4	4.8	3.7	1.9	2.0	5.8	6.4	4.3	13.0	6.6	50.8	5.4
Writing/Editing	2.3	0.4	1.1	1.1	0.8	3.5	2.0	2.9	2.2	1.5	1.9	4.6
Mktg/Oper/Insp	3.1	0.9	1.7	1.2	5.9	4.1	3.6	4.9	4.2	3.8	1.8	2.5
Other	1.8			1.0	0.8	2.2	0.3	4.9	2.2	2.0	1.8	2.9
No Report	1.6	2.9	0.5	1.6	0.9	0.5	1.3	2.2	1.7	1.1	1.9	2.1

*Includes full-time and part-time employed only.

the total population (14.4 percent for recent Ph.D.s compared with 10.6 percent for the total group). However, the difference is almost completely due to the number of recent psychology graduates who are so engaged. For most other fields, the percentage of recent graduates providing consulting or professional services is lower than that of the total population.

Finally, the proportion of recent graduates working primarily in management/administration (9.0 percent) is considerably lower than that of the total group (17.3 percent). This was to be expected, however, as this type of activity often requires older, more experienced individuals.

Salaries

Salary changes can often reflect supply/demand and working conditions. If scientists/engineers are in short supply, one would expect their salaries to increase as employers compete to attract or keep them. Salary levels of science/engineering Ph.D.s are also an important component of the cost of producing the nation's output of science and technology.

By Field of Doctorate

The median annual salary for full-time employed doctoral scientists and engineers (excluding those Ph.D.s employed in the U.S. military) was $40,200 in February 1983 (Table 2-11). This figure has been growing at an increasing rate since 1973, when it was $20,900, rising from a 5.5 percent annual increase between 1973 and 1975 to a 9.3 percent annual increase between 1981 and 1983. The highest 1983 salaries were reported by engineering Ph.D.s--$46,500. Doctorates in this field have consistently been the highest wage earners among science/engineering fields. Salaries for doctorates in psychology and the social sciences have consistently been among the lowest: $35,800 and $36,000, respectively, in 1983.

TABLE 2-11 Median Annual Salaries of Full-Time Employed Doctoral Scientists and Engineers by Sex, Years Since Ph.D., and Field of Ph.D., 1983 (in thousands of dollars)

Sex and Years Since Ph.D.	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL	$40.2	$37.8	$42.1	$43.9	$42.8	$40.6	$46.5	$37.4	$40.2	$36.7	$35.8	$36.0
5 or less	30.9	27.8	38.4	36.7	35.1	32.1	37.6	28.5	31.8	26.7	28.0	27.5
6-10	36.1	34.5	45.2	38.8	38.7	36.8	44.2	34.6	37.5	31.9	32.7	32.5
11-15	41.1	37.5	49.5	43.2	42.5	44.4	48.6	38.9	42.9	37.2	39.0	37.8
16-20	44.9	41.4		45.2	45.8	46.9	51.5	42.6	50.3	41.7	40.5	42.7
21-25	48.5	48.0		49.6	48.8	51.9	55.1	43.7	52.4	45.9	45.6	45.8
26-30	50.9	50.7		57.1	50.9	52.9	59.1	46.9	54.4	48.2	49.5	48.8
Over 30	53.4	56.2		55.1	52.9	54.5	58.2	50.5	55.7	52.6	51.5	50.6
Male, TOTAL	$40.9	$38.4	$42.3	$44.1	$43.7	$40.8	$46.7	$38.0	$42.5	$38.1	$37.3	$36.7
5 or less	32.1	27.6	38.0	36.8	35.3	32.1	37.7	28.7	33.0	27.1	28.7	28.0
6-10	36.7	35.0	45.3	38.8	39.1	36.9	44.2	34.7	38.9	33.2	33.8	32.8
11-15	42.0	37.8	49.7	43.3	43.0	44.6	48.6	39.0	44.5	38.0	39.9	38.2
16-20	45.2	41.6		45.3	46.5	47.8	51.5	42.6	50.6	42.7	40.6	43.9
21-25	48.9	48.6		49.7	50.1	52.0	55.1	43.8	55.2	46.8	46.1	46.1
26-30	51.6	51.2		57.3	51.8	53.3	59.1	47.0	55.4	49.3	50.0	49.0
Over 30	54.2	56.6		55.2	53.8	55.5	58.2	50.5	55.9	53.8	52.1	51.3
Female, TOTAL	$31.8	$33.5	$41.1	$38.1	$35.0	$35.6	$39.7	$29.2	$33.0	$30.7	$30.8	$31.0
5 or less	27.6	29.4	39.8	34.3	33.7	32.6	36.3	27.5	30.0	25.2	26.2	26.7
6-10	31.1	32.3	45.1	38.1	35.4	35.1	43.5	30.6	34.3	29.6	30.6	31.6
11-15	34.9	35.8		38.2	34.6	35.7	45.0	33.7	36.6	33.6	34.7	35.9
16-20	36.9	36.2		40.8	34.0	42.0			45.5	34.6	39.7	37.0
21-25	40.3	37.1		41.0	38.4				40.6	40.7	41.6	42.4
26-30	42.6				36.8					43.2	43.0	40.1
Over 30	44.0				42.3					42.4	45.5	46.1

NOTE: Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multiplied by 11/9 to adjust for a full-time scale. Medians were not reported for cells with less than 20 cases reporting salary, or with a sampling error of more than ± $2,000.

By Years Since Ph.D.

In general, the median annual salaries for Ph.D.s increased with years since receipt of Ph.D.[12] Computer scientists who had obtained their degrees in the past 15 years reported the highest salaries. This is most likely to reflect both the strong demand for and the limited supply of Ph.D.s with computer science degrees. Note that although Ph.D.s in mathematics had one of the lowest salaries for Ph.D.s with 5 or fewer years since receipt of degree, the median annual salary for those in the 30+ years category was the second highest across all fields, $56,200.

By Sex

Men earned higher salaries than women across all Ph.D. fields--$40,900 for men and $31,800 for women, a differential of $9,100 (or 28.6 percent). The greatest disparities by sex occurred in the medical sciences, $9,500 (or 28.8 percent of male salaries); agricultural sciences, $8,800 (or 30.1 percent); and chemistry, $8,700 (or 24.6 percent). However, salaries were similar for men and women with Ph.D.s in computer science, where men earned $42,300 compared to $41,100 for women. For men, the highest median annual salaries were reported in engineering ($46,700) and the lowest in the social sciences ($36,700). The highest salaries for women were reported by those with degrees in computer sciences ($41,100) and the lowest by women with degrees in agricultural sciences ($29,200).

Salary comparisons by gender and years since Ph.D. indicate that, for all fields combined, the median salary for men was consistently higher than that for women and that the gap widened as years since

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[12]There were only two exceptions to this finding: physics/astronomy and engineering Ph.D.s who had earned their degrees 26-30 years ago had median salaries higher than those physicists and engineers who had earned their degrees 30+ years ago. The reader should note, however, this difference is small.

TABLE 2-12 Median Annual Salaries of Full-Time Employed Doctoral Ph.D., 1983 (in thousands of dollars)

Sex and Type of Employer	All Fields	Field of Doctorate Math	Comp Sci	Phys/ Astrn	Chem
TOTAL	$40.2	$37.8	$42.1	$43.9	$42.8
Educational Institution	36.2	35.7	37.3	40.5	36.2
4-Year Coll/Univ/Med School	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2-Year College	31.9	31.0		27.9	33.2
Elem/Secondary School	[illegible]				[illegible]
Business/Industry*	47.2	44.2	49.4	47.5	46.0
U.S. Government, Civilian	44.9	45.1		45.4	45.0
State/Local Government	34.4				28.9
Hospital/Clinic	34.7			42.8	36.4
Other Non-Profit Organization	40.0	45.0		40.9	46.2
Male, TOTAL	$40.9	$38.4	$42.3	$44.1	$43.7
Educational Institution	36.9	36.1	37.2	40.6	36.5
4-Year Coll/Univ/Med School	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2-Year College	32.3				33.4
Elem/Secondary School	[illegible]				
Business/Industry*	48.0	44.8	49.8	47.8	46.8
U.S. Government, Civilian	45.3	45.2		45.5	45.3
State/Local Government	35.5				
Hospital/Clinic	35.7				
Other Non-Profit Organization	40.9	45.1		40.9	47.2
Female, TOTAL	$31.8	$33.5	$41.1	$38.1	$35.0
Educational Institution	30.2	31.1	38.4	34.4	29.6
4-Year Coll/Univ/Med School	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2-Year College	30.7				32.1
Elem/Secondary School	[illegible]				[illegible]
Business/Industry*	39.8	39.4	45.5	40.8	39.5
U.S. Government, Civilian	37.5	39.1		40.0	36.6
State/Local Government	30.5				30.3
Hospital/Clinic	30.9				
Other Non-Profit Organization	32.2				36.1

NOTE: Median salaries were computed only for Ph.D.s employed full-time, multiplied by 11/9 to adjust for a full-time scale. Medians were not sampling error of ± $2,000.

*Includes self-employed.

Scientists and Engineers by Sex, Type of Employer, and Field of

Field of Doctorate						
Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
$40.6	$46.5	$37.4	$40.2	$36.7	$35.8	$36.0
36.3	42.2	35.5	36.9	35.1	33.3	34.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				31.4	32.0	31.6
				[illegible]	[illegible]	
50.2	50.0	40.4	48.3	42.6	47.8	40.9
45.9	47.6	44.2	40.7	42.4	44.5	46.3
30.4	38.8	36.3	39.2	31.9	32.5	36.2
			38.5	37.9	32.8	
43.8	48.8	36.7	36.5	35.8	30.6	35.4
$40.8	$46.7	$38.0	$42.5	$38.1	$37.3	$36.7
36.5	42.3	35.8	40.2	36.2	35.7	35.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				31.5	32.3	35.0
					[illegible]	
50.5	50.1	40.6	48.9	43.9	50.3	42.8
46.7	47.8	44.4	42.5	43.1	45.3	48.4
30.3		36.5	40.3	32.0	33.3	37.0
			42.8	39.2	33.8	
44.4	48.8	36.6	40.2	36.7	30.9	37.7
$35.6	$39.7	$29.2	$33.0	$30.7	$30.8	$31.0
30.6	35.3	28.0	32.2	29.7	29.5	30.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				[illegible]	27.6	30.0
					[illegible]	
40.4	43.4	30.9	39.3	36.2	40.5	34.6
38.0	36.7		38.3	37.0	40.5	37.1
			34.7	31.7	28.9	30.4
			31.7	30.5	30.7	
				33.1	30.1	32.2

excluding those in the U.S. military. Academic salaries were reported for cells with less than 20 cases reporting salary; or a

Ph.D. increased. For example, in the "5 or less" category, the median salary for men was $4,500 (or 16.3 percent) higher than that for women; in the "11 to 15" class, the gap was $7,100 (or 20.3 percent higher for men); and in the "21-25" category, the differential was $8,600 (or 21.3 percent higher for men). Finally, for doctorates receiving their degrees more than 30 years ago, the gap was $10,200 (or 23.2 percent higher for men).

By Type of Employer

In 1983 the highest salaries were reported by those doctoral scientists and engineers employed by business/industry (including those who were self-employed) and by the federal government (Table 2-12). The estimated median annual salaries for Ph.D.s working for these employers were $47,200 and $44,900, respectively. For Ph.D.s employed in business/industry, the highest median salaries were reported by men in earth/environmental sciences, engineering, and psychology ($50,000+) and by women in computer sciences and engineering ($45,500 and $43,400, respectively). Ph.D.s employed by elementary/secondary schools ($31,300) and by two-year colleges ($31,900) had the lowest median salaries for all fields combined.

By field, the highest median salaries were earned by earth/environmental sciences and engineering Ph.D.s employed by business/industry (approximately $50,000 each). Those Ph.D.s in biological sciences and chemistry employed in elementary/secondary schools, most likely as teachers, had the lowest median annual salaries ($24,000 and $27,100, respectively).

Men consistently earned higher salaries than women. Business/industry and the federal government, the highest paying employers for both sexes, showed male-female salary differentials of $8,200 (or a 20.6 percent higher salary for men) and $7,800 (or a 20.8 percent higher salary for men), respectively. However, the largest differential, $8,700 (or 27.0 percent higher for men), occurred for those employed in non-profit organizations, a category that excludes hospitals/

clinics. The smallest gap was found for those employed in elementary/secondary schools, a differential of $500 (or 1.6 percent higher for men).

Academic Employment

The academic sector is an important provider of basic research and the major producer of future generations of scientists and engineers. It is useful, therefore, to examine its employment conditions more closely. Careful scrutiny of these conditions can provide clues about current and future career opportunities.

Table 2-13 Academic Position of Doctoral Scientists and Engineers, 1973 and 1983

Academic Position	1973	1983
Total Reporting Position	120,000	181,200
Faculty	91.5	88.0
Professor	30.1	42.4
Associate Professor	27.6	26.5
Assistant Professor	24.6	18.0
Instructor	1.1	1.1
Nonfaculty	4.9	7.3
Postdoctoral Appointment	3.6	4.7

Faculty Status and Rank

Longitudinal data (1973-1983) on science/engineering Ph.D.s in academic employment point to a slight shift from faculty positions to nonfaculty and postdoctoral appointments (Table 2-13). This shift may suggest a paucity of job opportunities in tenure-track positions in academic institutions. Controlling for those not responding to this item, the

proportion of Ph.D.s with faculty status in 1983 was 88.0 percent, down 3.5 percentage points from 1973.[13] Correspondingly, the proportion of nonfaculty positions increased 2.4 percentage points (from 4.9 percent in 1973 to 7.3 percent in 1983) and that of postdoctoral appointments by 1.1 percentage points (from 3.6 percent in 1973 to 4.7 percent in 1983). Among the faculty ranks (i.e., professor, associate professor, assistant professor, and instructor), only full professorships showed an increase, 4.3 percentage points (from 38.1 percent in 1973 to 42.4 percent in 1983). Associate professorships were down 1.1 percentage points (from 27.6 percent in 1973 to 26.5 percent in 1983). And most notable, assistant professorships were down 6.6 percentage points (from 24.6 percent in 1973 to 18.0 percent in 1983). The percentages of Ph.D.s employed as instructors remained unchanged (1.1 percent in both 1973 and 1983). In summary, while there appeared to be some shift toward the upper end of the faculty ranks (i.e., out of assistant and associate professorships), a comparable redistribution did not appear to be taking place between nonfaculty and postdoctoral appointments and faculty positions.

By Years Since Ph.D.

Table 2-14 presents a breakdown of 1983 data on academic position by cohort, field of doctorate, and sex. For both genders and all cohort groupings, the majority of academically employed science/engineering Ph.D.s were faculty members. The percentages were highest for the 1960-1969 cohort, with 93.5 percent of the men and 84.9 percent of the women employed as faculty members. Overall, faculty proportions decreased as years since Ph.D. receipt decreased: in the 1976-1982 cohort

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[13]Percentages presented here for longitudinal comparison are based on the total number of academically employed doctorates who reported their academic positions. The respective "no report" figures for 1973 and 1983 were 3.5 percent (of 124,340 academically employed) and 4.1 percent (of 188,909). Table 2-14, which concentrates solely on the 1983 population, does include all those who were academically employed.

only 71.4 percent of the men and 62.4 percent of the women were faculty members. Percentages of the male and female Ph.D.s with nonfaculty status or postdoctoral appointments generally increased with cohort recency. Of those working in nonfaculty positions, the majority were employed as research staff.

For faculty members, the percentage of science and engineering Ph.D.s with the academic rank of full professor was greater for men than for women in all but the most recent cohort, where a slightly higher percentage of women were full professors in the EMP fields (engineering, math sciences, and physical sciences)[14] and the life sciences (agricultural, biological, and medical sciences). As would be expected, the percentage of Ph.D.s with full professor ranking increased and the percentage with the rank of associate/assistant decreased as the years since earning the Ph.D. degree increased.

By Sex

It is interesting to note that for the 1940-1959 and 1960-1969 cohorts, women were more likely than men to be associate professors (1940-1959: 18.7 percent of women compared to 6.2 percent of men; 1960-1969: 32.7 percent of women compared to 21.0 percent of men), assistant professors (1940-1959: 3.5 percent of women compared to 0.7 percent of men; 1960-1969: 8.4 percent of women compared to 1.6 percent of men), and instructors (1940-1959: 2.2 percent of women compared to 0.4 percent of men; 1960-1969: 2.0 percent of women compared to 0.4 percent of men). For the 1970-1975 and the 1976-1982 cohorts, when the Ph.D.s were likely to be younger and less experienced, both men and women more frequently held intermediate or lower ranks rather than full professorships. Among those ranks, however, smaller percentages of women than men held the higher ranking positions: among the 1970-1975 graduates,

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[14]"Math sciences" includes mathematics and computer sciences; "physical sciences" includes physics/astronomy, chemistry, and earth/environmental sciences.

TABLE 2-14 Academic Position of Doctoral Scientists and Engineers by Year of Ph.D., Field of Ph.D., and Sex, 1983 in percent

Academic Position	All Fields		Field of Doctorate/Sex EMP		Life Sciences		Behav/Soc Sci	
	Male	Female	Male	Female	Male	Female	Male	Female
Total, 1940-1959 Ph.D.s	28,400	2,000	11,700	500	9,000	900	7,700	700
Faculty	92.5	84.0	88.3	84.3	96.2	80.1	94.5	88.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Associate Professor	6.2	18.7	5.3	15.2	7.8	20.3	5.2	18.5
Assistant Professor	0.7	3.5	1.1	3.6	0.3	5.4	0.7	1.3
[illegible]	0.4	2.2	0.6	1.6	0.1	2.7		0.1
Nonfaculty	3.9	7.4	6.7	7.1	1.9	8.7	2.1	6.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	0.4	0.5	0.4		0.2	0.6	0.5	0.7
Other/No Report	3.2	8.1	4.6	8.6	1.7	10.6	2.8	5.0
Total, 1960-1969 Ph.D.s	52,100	4,900	24,400	900	13,900	1,900	13,700	2,000
Faculty	93.5	84.9	91.3	79.1	95.5	84.9	95.3	87.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Associate Professor	21.0	32.7	18.9	31.0	23.0	37.1	22.7	29.3
Assistant Professor	1.6	8.4	1.1	7.8	2.4	11.9	1.8	6.3
[illegible]	0.4	2.0	0.3	2.8		2.0		1.5
Nonfaculty	4.1	7.6	6.2	11.5	2.1	8.9	2.2	4.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	0.1	1.2		1.5	0.3	1.1	0.3	1.2
Other/No Report	2.3	6.3	2.5	7.8	2.1	5.0	2.3	6.9

Total, 1970-1975 Ph.D.s	41,700	7,800	15,400	1,100	12,400	2,900	13,800	3,800
Faculty	86.8	83.0	81.6	76.0	88.3	79.7	91.4	87.5
Professor	25.1	14.1	24.9	13.1	20.7	12.5	29.2	17.0
Associate Professor	48.8	44.4	46.6	36.2	50.9	38.6	49.3	51.2
Assistant Professor	12.1	21.4	9.4	21.9	15.7	26.1	12.0	17.6
Instructor	0.8	2.4	0.6	4.8	1.0	2.5	0.8	1.7
Nonfaculty	7.1	7.9	12.7	15.3	5.6	10.1	2.2	4.1
Teaching Staff*	0.7	0.9	0.8	1.6	0.9	0.4	0.4	1.1
Research Staff†	6.4	7.0	12.9	13.7	4.7	9.7	1.8	3.0
Postdoctoral Appointment	1.3	2.9	1.2	1.7	1.3	4.6	1.5	1.9
Other/No Report	4.7	6.3	4.4	7.0	4.8	5.6	4.9	6.5
Total, 1976-1982 Ph.D.s	39,200	12,800	13,600	1,400	12,500	5,200	13,200	6,200
Faculty	71.4	62.4	68.1	60.7	62.7	49.9	82.9	73.2
Professor	1.3	2.3	1.4	1.8	0.3	2.2	3.1	2.4
Associate Professor	20.2	12.0	18.4	9.8	13.1	9.1	28.8	14.9
Assistant Professor	47.6	44.8	47.0	47.1	47.0	34.8	48.9	52.6
Instructor	2.1	3.3	1.3	2.1	2.3	3.8	2.0	3.3
Nonfaculty	9.7	10.3	14.6	12.5	7.8	11.3	6.5	9.0
Teaching Staff*	0.8	2.1	0.8	2.3	0.5	2.0	1.4	3.1
Research Staff†	8.9	8.1	13.7	10.2	7.3	9.1	5.0	5.8
Postdoctoral Appointment	13.6	17.4	12.2	18.2	25.3	31.4	3.8	5.6
Other/No Report	5.4	9.9	5.1	8.6	4.2	7.5	6.8	12.2

*Includes nonfaculty staff members whose primary work activity is teaching.
†Includes nonfaculty staff members whose primary work activity is basic research, applied research, development, or design.
NOTE: EMP = Engineering, Mathematics, Computer Sciences, Physics/Astronomy, Chemistry and Earth/Environmental Sciences. Life Sciences = Agricultural Sciences, Medical Sciences, and Biological Sciences. Behav/Soc Sci = Psychology and Social Sciences.

44.4 percent of the women compared to 48.8 percent of the men were associate professors; and for the 1976-1982 graduates, only 12.0 percent of the women compared to 20.2 percent of the men. In this last cohort, 44.8 percent of the women, compared to 47.6 percent of the men, were assistant professors.

Tenure Status by Field, Sex, and Age

For the Ph.D.s who reported their tenure status, the proportion tenured has increased over the survey years, rising from 62.7 percent in 1978 to 68.1 percent in 1983. This corresponds to the increase in full and associate professorships noted in the previous section. There was a substantial difference by sex in tenure status. Almost two-thirds (65.5 percent) of the men but only two-fifths (39.2 percent) of the women were tenured (Table 2-15). Similar differences occurred in each field and age group.

For the 25.8 percent of the nontenured men in 1983, over one-half were in tenure-track positions. Among nontenured women, less than half were in tenure-track positions. Correspondingly, the reverse was true for the nontenured, nontenure-track category. Roughly 3 out of every 10 nontenured men were in nontenure-track positions while about 4 of every 10 nontenured women were in nontenure-track jobs.

Not surprisingly, Ph.D.s aged 35 or under continue to be the most likely to be in nontenured positions (66.0 percent for men and 69.5 percent for women). However, it should be noted that for this age group the figures in the nontenured category appear to be somewhat underestimated. These figures are substantially lower than those reported in 1981 (77 percent for both men and women) while the proportion of "no reports" for this group has increased by the same approximate magnitude. This may reflect a change in the format of the tenure status question in the 1983 survey.[15] As a result of this change, indi-

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[15]The 1983 survey form (see Appendix B, page 107) merely requested the respondent to verify tenure status information on file from the 1981 survey.

TABLE 2-15 Tenure Status of Academically Employed Science and Engineering Ph.D.s by Field of Doctorate, Age, and Sex, 1983

Age and Tenure Status	Field of Doctorate/Sex							
	All Fields		EMP		Life Sciences		Behav/Soc Sci	
	Male	Female	Male	Female	Male	Female	Male	Female
Total Academically Employed (N)	161,400	27,500	65,200	3,900	47,800	10,900	48,400	12,700
Tenured	65.5	39.2	64.8	38.9	62.2	32.1	69.6	45.4
Not Tenured	25.8	47.1	24.6	45.7	29.2	51.4	24.2	43.9
In Track Position	14.0	20.3	12.5	20.2	15.8	17.6	14.7	24.0
Not in Track Position	8.4	19.9	8.2	20.4	10.0	26.6	7.0	14.0
Type Position Unknown	3.5	6.3	3.9	5.1	3.4	7.2	2.6	5.9
No Report	8.7	13.7	10.5	15.4	8.6	16.5	6.2	10.7
Age - 35 or Under (N)	26,400	7,600	9,900	1,100	8,900	3,200	7,600	3,300
Tenured	13.4	7.6	13.5	7.3	6.4	3.4	21.3	11.7
Not Tenured	66.0	69.5	64.8	66.6	69.7	66.7	63.1	73.0
In Track Position	44.0	36.8	43.9	40.7	42.6	25.5	45.6	46.4
Not in Track Position	15.4	25.1	14.4	21.6	20.8	32.1	10.5	19.4
Type Position Unknown	6.5	7.6	6.5	4.3	6.3	9.1	6.9	7.2
No Report	20.7	23.0	21.7	26.1	23.9	29.9	15.6	15.3
Age - 36 to 45 (N)	63,400	11,700	25,900	1,600	18,700	4,600	18,800	5,500
Tenured	63.9	41.8	64.1	40.6	60.0	33.7	67.6	49.0
Not Tenured	28.9	46.7	26.7	45.6	33.5	53.1	27.5	41.7
In Track Position	15.6	20.4	13.0	18.4	18.7	19.3	16.2	21.9
Not in Track Position	9.8	19.8	9.6	22.1	10.9	26.3	8.8	13.5
Type Position Unknown	3.6	6.6	4.1	5.1	3.9	7.5	2.5	6.3
No Report	7.1	11.5	9.2	13.8	6.5	13.2	4.9	9.3
Age - 46 or Older (N)	71,500	8,200	29,400	1,200	20,200	3,000	21,900	3,900
Tenured	86.2	64.9	82.7	65.0	88.8	60.0	88.4	68.8
Not Tenured	8.2	27.0	9.3	27.1	7.3	32.8	7.6	22.5
In Track Position	1.5	7.0	1.6	4.2	1.4	6.8	1.3	8.0
Not in Track Position	4.5	15.3	4.9	17.0	4.3	21.2	4.2	10.3
Type Position Unknown	2.2	4.6	2.8	5.9	1.6	4.8	2.1	4.2
No Report	5.6	8.1	8.0	7.9	3.9	7.2	4.0	8.8

NOTE: EMP = Engineering, Mathematics, Computer Sciences, Physics/Astronomy, Chemistry and Earth/Environmental Sciences. Life Sciences = Agricultural Sciences, Medical Sciences, and Biological Sciences. Behav/Soc Sci = Psychology and Social Sciences.

viduals who were not tenured (and for whom tenure status may not have applied--e.g., postdoctoral appointees) may have left this question blank in 1983.

Across fields, the behavioral sciences generally had the highest percentages of tenured Ph.D.s for both sexes, the only exception being for males in the "46 or older" group. The life sciences, on the other hand, generally had the lowest percentage of tenured Ph.D.s. Again, the only exception was for males in the "46 or older" group.

III

HUMANITIES DOCTORATES

Doctoral Population by Field of Degree and by Field of Employment

An estimated total of 85,200 humanists earned their doctoral degrees between January 1, 1940, and June 30, 1982, and were residing in the U.S. in February 1983. The categories for the humanities Ph.D. fields have remained the same since the 1979 survey: history, art history, music, speech/theater, philosophy, English and American language/literature, classics, modern language/literature, and "other" humanities (library and archival sciences, linguistics, archeology, American studies, religious studies, general humanities, and other humanities). However, the 1983 report includes additional subfields under these broad field classifications.[16] The addition of these subfields has increased the 1983 humanities population by 5.8 percent (or 4,700). Excluding Ph.D.s from newly added fields, the number of

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[16]The following fields, counted as subfields of social sciences in Chapter I, were included in broad humanities fields in Chapter II: history and philosophy of science (code 775) was counted in the broad field of history; linguistics and archeology were counted in "other" humanities. The field of religious studies, added to the 1983 humanities field categories, is also counted in "other" humanities in this report. American studies, which was counted as a history subfield in previous SDR surveys, is now subsumed under "other" humanities. Table 3-1 provides counts for selected subfields of "other" humanities so that the reader may know precisely how much these transfers or additions contribute to the increased counts under "other."

humanists has grown by 5.9 percent from that of 1981, lower than the 6.7 percent noted between 1979 and 1981. The largest fields continued to be English and American language/literature (26.8 percent), history (23.9 percent), and modern language/literature (17.8 percent).

Table 3-1 gives the estimated number of humanities Ph.D.s classified according to the broad fields detailed above. Also given in this table are the numbers and percentages of these humanities Ph.D.s by the employment status and field in which they were working. The table clearly shows that the number by Ph.D. field exceeds the number by employment field for virtually all humanities disciplines. This is largely due to the fact that 15,100, or 17.8 percent, of these Ph.D.s indicated that they were employed in nonhumanities fields. This percentage is almost three times as large as the comparable percentage re-

TABLE 3-1 Distribution of Ph.D.s in the Humanities in the United States (1940-1982 Graduates) by Field of Doctorate and Field of Employment, 1983

	Field of Doctorate		Field of Employment	
	N	%	N	%
All Fields (N)	85,200	100.0	85,200	100.0
History	20,400	23.9	12,300	14.4
Art History	2,400	2.8	1,900	2.2
Music	5,900	6.9	4,600	5.4
Speech/Theater	3,700	4.3	2,200	2.5
Philosophy	6,500	7.6	3,800	4.4
English and American Lang/Lit	22,800	26.8	14,500	17.0
Classical Lang/Lit	1,900	2.2	1,100	1.3
Modern Lang/Lit	15,100	17.8	9,500	11.1
"Other" Humanities	6,500	7.6	5,700	6.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nonhumanities			15,100	17.8
No Report on Employment Field			5,900	6.9
Not Employed			7,700	9.0
No Report on Employment Status			900	1.1

ported for scientists and engineers in Chapter II and can be indicative of a potentially serious misallocation of these highly-trained human resources. The effects and implications of this relatively large amount of nonhumanities employment are examined in a special study based on SDR data.[17] Appendix H provides greater detail on the fields of employment for humanities Ph.D.s, including how those 17.8 percent were distributed.

Fields producing the largest number of humanities Ph.D.s were the ones that experienced the greatest difference in numbers between degree field and employment field. The difference was substantial in the fields of history (8,100), English and American language/literature (8,300), and modern language/literature (5,600). However, it should be noted that those reporting employment in the subfield, "unspecified other humanities" under the broad field of "other" humanities, was more than twice the number reported by degree field (1,400 to 2,900).

Field Mobility of Employed Ph.D.s

Information on field mobility, being employed in a field other than one's doctoral field, indicates the ability of the Ph.D. recipients to adapt to changing employment opportunities. As was true in 1981, 90 percent of the individuals with Ph.D.s in the humanities were employed in February 1983. The relationship that exists between their field of employment and their field of degree is shown in Table 3-2.

The Ph.D. fields retaining the highest percentage of their graduates continued to be music (83.4 percent) and art history (79.8 percent). Although "other" humanities had the lowest retention rate (with only 44.2 percent), most fields experienced an outflow of between 35 and 40 percent from Ph.D. field to employment field.

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[17]Belisle, M., and B. D. Maxfield, Humanists at Work: Employment Patterns for Humanities Ph.D.s, Washington, D.C.: National Academy Press, 1985.

TABLE 3-2 Field Mobility of Employed Humanities Doctorates (1940-1982 Graduates), 1983 (in percent)

Field of Employment	Total Employed	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
All Fields	76,600	18,500	2,100	5,400	3,300	6,100	20,300	1,700	13,300	5,900
History	16.0	64.4	0.6		0.6	0.1		0.5	0.5	3.8
Art History	2.5	0.3	79.8	0.3		0.1	0.1	0.5	0.1	1.6
Music	6.0			83.4			0.3		0.1	0.1
Speech/ Theatre	2.8	0.1	0.1		60.9	0.3	0.5		0.1	0.4
Philosophy	4.9	0.3		8		60.0		1.6	0.1	0.8
Engl/Amer Lang&Lit	19.0	0.3		0.1	4.0	0.9	64.1	1.6	3.8	10.1
Classics	1.4						0.1	58.9	0.5	0.5
Mod Lang&Lit	12.4	0.3			0.6	0.1	0.5	4.9	66.6	5.3
Other Humanities	7.5	2.9	2.7	1.3	3.0	4.8	6.6	6.0	4.8	44.2
Nonhumanities	19.8	24.1	9.3	8.1	24.7	25.9	18.9	17.6	15.3	25.3
No Report	7.7	7.3	7.4	6.7	6.3	7.8	8.2	8.4	8.2	8.0

NOTE: Includes postdoctoral appointees as well as full-time and part-time employed doctorates.

Those humanists who secured jobs outside their specialty fields reported that they were largely taking jobs in nonhumanities fields (e.g., education). This was especially true for Ph.D.s in history, speech/theater,[18] philosophy, and "other" humanities--where approximately one out of every four graduates left his or her Ph.D. field for employment in a nonhumanities area.

Demographic Characteristics by Field of Doctorate

The demographic characteristics summarized below have been and continue to be of interest to policy makers. The distributions by gender and racial/ethnic group have been used to illuminate the issues of underrepresentation. The age characteristics can be used to shed light on the topic of the continuity and vitality of our human resource base.

Sex

Women constituted 28.5 percent of the estimated 85,200 humanities Ph.D.s in February 1983 (Table 3-3), about the same as in 1981 (27.2 percent). Similar gender distributions were found for all humanities subfields. The smallest percentages of females occurred in history (16.6 percent) and philosophy (14.6 percent). The largest percentages were found in art history (48.8 percent) and modern languages/literature (41.6 percent). It is interesting to note here that the greatest increases occurred in these same two fields, which had already rep-

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[18]For purposes of this report, only individuals who identified their doctoral degrees as "speech and debate" (code 831) or "theater and theater criticism" (code 809) are included in the humanities field category "speech/theater." Ph.D.s in the related field of "communications" (code 708) are included under the social sciences, and those in "audiology and speech pathology" (code 530) are included in the medical sciences field in the science chapter.

TABLE 3-3 Demographic Characteristics of Ph.D.s (1940-1982 Graduates)

Demographic Characteristics	All Fields	Field of Doctorate: History	Art History	Music
Total Population (N)	85,200	20,400	2,400	5,900
Sex				
Male	71.5	83.4	51.2	79.1
Female	28.5	16.6	48.8	20.9
Racial/Ethnic Group				
White	91.5	91.9	94.2	92.7
Minority Group	6.2	5.2	4.0	5.0
Hispanic	2.9	1.7	1.1	0.9
Black	1.6	1.8	0.9	2.3
Asian	1.6	1.6	1.9	1.5
American Indian	0.1	0.1	0.2	0.3
Other/No Report	2.3	2.9	1.8	2.3
Age in 1983				
Under 30	0.4	0.1		1.7
30-34	7.2	5.9	6.9	10.3
35-39	17.7	15.6	23.4	19.0
40-44	22.0	23.3	25.6	20.0
45-49	15.5	16.8	10.7	12.5
50-54	12.1	13.4	10.8	13.2
55-59	9.0	8.3	8.6	8.5
60-64	6.9	7.3	4.7	6.8
Over 64	8.9	8.9	9.0	8.0
No Report	0.2	0.4	0.3	
Median Age (Years)	45	46	43	44
Calendar Year of Ph.D.				
1940-1949	3.9	4.9	2.6	1.7
1950-1959	11.0	12.7	9.1	8.7
1960-1969	24.4	25.9	18.8	18.0
1970-1974	26.5	27.4	22.5	22.9
1975-1979	23.7	20.4	33.4	33.6
1980-1982*	10.5	8.7	13.6	15.1
Citizenship				
U.S.	96.9	98.3	94.3	98.6
Native	88.9	91.6	87.3	94.7
Naturalized	7.1	5.5	6.1	3.2
Unspecified	1.0	1.2	0.8	0.6
Non-U.S.†	3.0	1.6	5.5	1.4
No Report	0.1	0.1	0.2	

*Excludes Ph.D.s awarded July-December 1982.

†In view of the lack of a comprehensive sampling frame for foreign- who are foreign citizens may be somewhat underestimated.

In the Humanities by Field of Doctorate, 1983 (in percent)

Speech/ Theater	Philosophy	Field of Doctorate English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
3,700	6,500	22,800	1,900	15,100	6,500
77.5	85.4	66.2	70.7	58.4	67.3
22.5	14.6	33.8	29.3	41.6	32.7
93.4	93.3	95.1	95.5	84.0	88.8
3.1	5.0	3.4	1.5	13.4	9.0
[illegible]					
3.5	1.7	1.5	3.0	2.6	2.3
0.4	0.5	0.4	0.5	0.3	0.8
4.8	9.4	6.0	7.4	7.2	12.0
12.8	19.8	18.0	18.6	17.8	19.7
16.5	20.8	23.3	20.8	20.9	21.9
16.3	14.7	15.9	16.1	15.6	14.4
9.6	11.7	10.3	10.2	13.3	13.6
17.9	9.9	9.4	6.7	8.9	4.9
10.3	6.4	6.7	7.3	6.5	7.3
11.1	6.8	10.0	11.8	9.3	5.4
0.2	0.1	0.1	0.7	0.2	0.1
49	44	45	45	46	44
3.1	3.7	4.2	8.5	4.0	1.5
12.6	12.3	10.8	12.5	10.0	8.7
34.7	24.5	26.6	29.7	22.3	17.3
23.3	27.4	27.2	25.0	27.8	23.7
17.2	22.9	22.1	15.8	25.3	30.5
9.1	9.1	9.1	8.6	10.6	18.3
97.7	97.1	98.8	97.8	92.4	95.2
[illegible]					
1.8	2.9	1.1	2.2	7.6	4.8
0.5				0.1	

earned Ph.D.s in the United States, the number of humanities Ph.D.s

resented roughly equal proportions of men and women. In that same vein, the smallest increases were in history and philosophy, fields in which women had already comprised a relatively small proportion. All but two of the subfields, classical languages/literature and "other" humanities, saw increases of 0.1 to 2.5 percent from 1981 to 1983 in the percentage of women.

Minorities

Members of racial/ethnic minority groups (i.e., Hispanic, Black, Asian, and American Indian) constituted 6.2 percent of the humanities Ph.D. population. Hispanics comprised the largest minority group while American Indians comprised the smallest (Table 3-3). Modern language/literature had the greatest percentage of minorities, 13.4 percent (Hispanics comprised three-fourths of this figure). The next highest representation was in "other" humanities (which includes library and archival sciences, linguistics, archeology, American studies, religious studies, general humanities, and other humanities), where minorities comprised 9.0 percent of that population (Asians made up more than one-half of that percentage). The field with the smallest portion of minorities, 1.5 percent, was classical languages/literature.[19]

Age

The median age of Ph.D. humanists was 45 years. The highest median age, 49 years, was found in the field of speech/theater, with 21.4 per-

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[19]It should be noted, however, that for the 1983 report any individual in the SDR sample who had given an inconsistent response or more than one response to the race/ethnic question in previous surveys was reclassified into the racial/ethnic group that he or she had given the most frequently. Those survey respondents who consistently reported multiple responses to this item were classified as "other" minority in the 1983 report.

cent aged 60 years or older (Table 3-3). The field of classical languages/literature also had a fairly high percentage, 19.1 percent, of Ph.D.s 60 years or older.

Year of Degree

The overall percentage of Ph.D.s granted in recent years far exceeds that of earlier years. Over one-third, 34.2 percent, of the humanities doctoral degrees were awarded in the last 7 1/2 years, and 60.7 percent were awarded in the last 12 1/2 years.

The rising long-range trend in degree production in humanities is reflected in comparison of the number of humanities doctorates by decade of degree. For all fields combined, the number of individuals receiving their degrees in 1940-1949 totaled 3.9 percent. This figure was almost three times as large in 1950-1959, when 11 percent of the humanists received their degrees, and was more than twice as large in each of the next two decades: 24.4 percent in 1960-1969 and 50.2 percent in 1970-1979. A similar, though not parallel, increase was evident for each individual discipline, with the highest percentages falling between 1970 and 1979. It should be noted that the smallest gains for that period were made in the fields of speech/theater, which increased only 5.8 percentage points from 1960-1969, and classical languages/literature, which increased only 11.1 percentage points. In all humanities fields combined, 10.5 percent of the doctoral degrees earned were awarded between 1980 and 1982.

Foreign Citizens

In 1983, 3.0 percent of the humanities Ph.D.s in the United States were foreign citizens, an increase of 0.3 percentage points since 1981. The degree fields with the largest percentage of foreign citizens were modern languages/literature, art history, and "other" humanities (7.6 percent, 5.5 percent, and 4.8 percent, respectively). The lowest percentages of foreign citizens were found in English and American litera-

ture, music, and history (1.1 percent, 1.4 percent, and 1.6 percent, respectively). Of the U.S. citizens, 88.9 percent were native and 7.1 percent were naturalized. Among the humanities disciplines, naturalized citizens were most highly represented in the field of modern languages/literature with a percentage of 19.3 percent. The next highest incidence (7.4 percent) was found in the "other" humanities category.

Labor Force Status by Field of Doctorate

Labor force participation rates--i.e., the fraction of the population that is either employed or seeking work--provide useful information on the "supply" of these highly trained human resources-- i.e., the extent to which they are actively involved in the labor market. In addition, the complement of this rate--i.e., the nonparticipation rate--can provide useful clues about possible underutilization of these resources, particularly those who are discouraged from seeking work because they do not think jobs are available.

Most members of this doctorate population are actively involved in the labor force (Table 3-4). The 1983 survey revealed that 77,900, or 91.4 percent, were in the labor force. The labor force participation rate for this group has remained relatively constant throughout the survey years: 92.3 percent in 1977; 91.0 percent in 1979; and 91.7 percent in 1981.

Retirees constitute 71 percent of those not in the labor force in 1983. The share of the humanities Ph.D. population not in the labor force varied by field, ranging from a low of 5.7 percent in philosophy to a high of 11 percent in modern languages/literature.

Data limitations make it difficult to estimate the number of humanities doctorates who were not in the labor force because they were discouraged from seeking work by perceived gloomy job prospects. Evidence providing the basis for a rough estimate can be gleaned from Table 3-4 by noting the percentages who were not in the labor force and not seeking employment--1.7 percent averaged over all fields, ranging

TABLE 3-4 Labor Force Status of Ph.D.s (1940-1982 Graduates) in the Humanities by Field of Doctorate, 1983 (in percent)

Labor Force Status	Field of Doctorate: All Fields	History	Art History	Music	Speech/ Theater	Philosophy	English American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Total Population (N)	85,200	20,400	2,400	5,900	3,700	6,500	22,800	1,900	15,100	6,500
In Labor Force	91.4	92.0	91.0	92.2	89.6	94.3	90.6	90.6	90.2	93.1
Not In Labor Force	7.6	6.9	7.9	7.0	9.3	4.6	8.3	8.1	8.9	5.3
Not Seeking Employment	1.7	1.1	2.8	1.6	1.2	1.6	1.6	2.7	2.6	1.1
Retired	5.3	5.7	4.3	4.9	7.9	2.6	5.8	4.5	5.5	3.5
Other	0.6	0.1	0.8	0.5	0.2	0.4	0.9	0.9	0.8	0.7
No Report	1.1	1.1	1.1	0.8	1.1	1.1	1.0	1.3	0.8	1.7

TABLE 3-5 Employment and Unemployment of Humanities Ph.D.s in the U.S.

Labor Force Status/Sex	Field of Doctorate: All Fields	History	Art History	Music
TOTAL Ph.D. Labor Force* (N)	77,900	18,700	2,200	5,400
Employed Full-Time	89.6	91.7	86.1	89.6
(In Nonhumanities)**	(17.8)	(22.9)	(8.4)	(7.9)
Employed Part-Time	7.3	5.8	9.9	8.0
Seeking Full-Time Employment	2.7	1.9	3.0	2.8
Not Seek. F-T Empl./No Report	4.6	3.9	7.0	5.1
Postdoctoral Appointment	1.4	1.3	1.4	1.3
Unemployed and Seeking Employ	1.7	1.2	2.5	1.1
Ph.D. Labor Force*, Male (N)	56,400	15,800	1,100	4,300
Employed Full-Time	92.9	93.6	94.8	94.0
(In Nonhumanities)**	(17.7)	(22.6)	(11.6)	(8.1)
Employed Part-Time	4.8	4.2	2.7	4.2
Seeking Full-Time Employment	1.7	1.1	0.9	1.4
Not Seek. F-T Empl./No Rept.	3.2	3.1	1.8	2.7
Postdoctoral Appointment	1.2	1.4	1.3	1.0
Unemployed and Seeking Employ	1.1	0.8	1.2	0.9
Ph.D. Labor Force*, Female (N)	21,500	2,900	1,100	1,100
Employed Full-Time	81.0	80.8	77.1	73.4
(In Nonhumanities)**	(18.0)	(24.7)	(5.0)	(7.3)
Employed Part-Time	13.8	14.9	17.5	22.2
Seeking Full-Time Employment	5.5	6.3	5.1	8.0
Not Seek. F-T Empl./No Rept.	8.4	8.6	12.4	14.2
Postdoctoral Appointment	1.9	0.8	1.6	2.5
Unemployed and Seeking Employ	3.3	3.5	3.9	1.8

*Includes full-time and part-time employed, postdoctoral appointees, may not add to totals because of rounding.

**As part-time and postdoctoral appointment rates in non-humanities the respective rates for part-time employment and postdoctoral 1.5 percent and 0.1 percent; male labor force--1.2 percent and

Labor Force by Sex and Field of Doctorate, 1983 (in percent)

Field of Doctorate					
Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
3,300	6,100	20,700	1,700	13,700	6,000
90.4	91.5	90.0	88.0	86.7	88.2
(22.7)	(23.5)	(18.2)	(15.4)	(13.0)	(22.6)
6.8	7.0	7.2	9.2	9.0	7.0
3.3	3.0	2.0	2.2	4.7	2.6
3.4	1.1	5.2	6.9	4.3	4.4
2.0	0.4	0.8	1.0	2.0	2.9
0.8	1.1	2.0	1.8	2.3	1.9
2,600	5,300	13,800	1,200	8,200	4,100
92.7	93.2	92.6	93.1	91.6	91.9
(23.5)	(23.3)	(18.4)	(17.2)	(11.9)	(22.2)
4.7	5.5	5.6	5.2	5.1	4.7
2.7	2.2	1.6	1.4	2.4	2.1
1.9	3.3	4.1	3.0	2.7	2.6
2.1	0.2	0.5	1.1	1.7	2.4
0.5	1.1	1.3	0.6	1.7	1.0
700	900	6,900	500	5,500	2,000
81.5	81.2	84.9	74.2	79.3	80.3
(19.5)	(24.3)	(19.1)	(10.7)	(14.5)	(23.2)
14.9	16.6	10.3	19.9	14.9	11.8
5.6	7.7	3.0	4.6	8.1	3.5
9.3	8.9	7.4	15.3	6.7	8.3
1.6	1.0	1.4	0.9	2.5	4.0
1.9	1.2	3.4	5.0	3.3	3.9

and those unemployed and seeking employment. Numbers and percentages

fields were small, they were not illustrated. For all fields combined, appointments in non-humanities fields were as follows: total labor force--0.1 percent; female labor force--2.4 percent and 0.3 percent.

from a low of 1.1 percent in history and other humanities to a high of 2.8 percent in art history. Since only a fraction of these Ph.D.s may be discouraged, this represents a crude upper bound in the actual amount of this type of underutilization.

Employment Status

Given participation in the labor force, information on the employment status of these Ph.Ds provides a more enriched appreciation of their utilization and the extent to which they may be underutilized. A number of indicators of underutilization can be generated from the data summarized in Table 3-5. The unemployment rate--the percent of those in the labor force who are not employed but seeking work--is a standard, commonly accepted indicator of excess supply. The complement, however, (i.e., the employment rate) can mask a considerable amount of underutilization. Table 3-5, therefore, also highlights two groups of employed, but potentially underutilized, resources--those working part-time but seeking full-time employment and those involuntarily employed in nonhumanities positions because they cannot find humanities jobs. Because of data limitations, however, the indicator of the latter type of underutilization presented in Table 3-5--i.e., the percent employed in nonhumanities--also includes those who have voluntarily opted for this type of employment. It overstates, therefore, the amount of underutilization represented by involuntary employment in nonhumanities jobs.

Almost all of the humanities Ph.D.s in the labor force were employed (89.6 percent in full-time jobs and 7.3 percent in part-time positions). However, roughly 2.7 percent of those who were employed in part-time positions reported that they were seeking full-time employment, and an estimated 1.7 percent were unemployed (see Table 3-5). The unemployment rate, although up slightly from 1981 (0.2 percentage points), is down 1.2 percentage points from 1977. Similar decreases from 1977 occurred for both men and women.

By Sex

The unemployment rate differed by gender. In 1983, 1.1 percent of the men and 3.3 percent of the women were unemployed. In 1977, the respective rates were 1.9 percent and 6.8 percent. The highest rate of unemployment for women was for those in classical languages/literature (5.0 percent); for men it was in modern languages/literature (1.7 percent). With the exception of women with philosophy degrees, unemployment rates for women exceeded the highest unemployment rate reported by male humanities Ph.D.s.

Women with degrees in the humanities fields still have greater difficulties in securing full-time employment than do men in these fields (81.0 percent of the women were employed in full-time positions compared to 92.9 percent of the men). However, roughly equal proportions were employed in nonhumanities fields (17.7 percent of men and 18.0 percent of women). Of the 4.8 percent of the male Ph.D.s in part-time jobs, only 1.7 percent indicated they were looking for full-time jobs. Women, on the other hand, were employed part-time at a rate of 13.8 percent with 5.5 percent seeking full-time work.

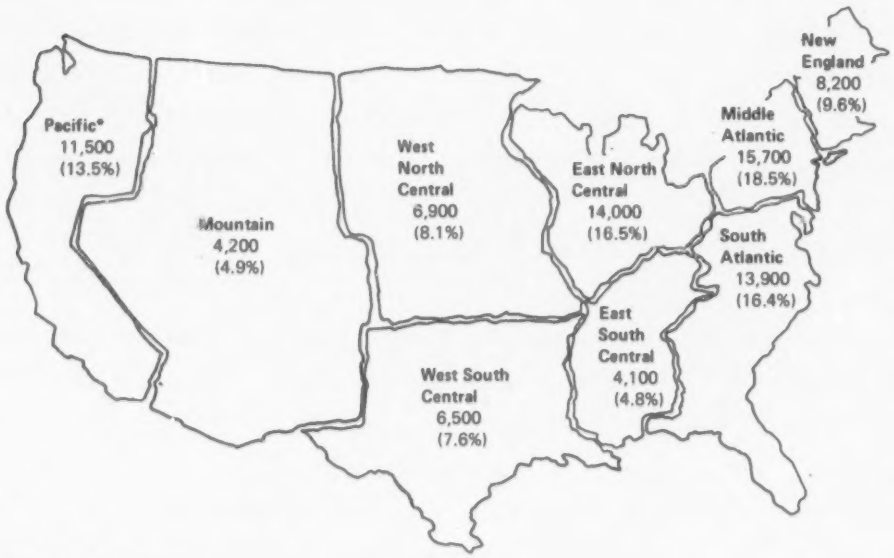
By Field of Doctorate

Ph.D.s in speech/theater had the lowest rate of unemployment, 0.8 percent, while Ph.D.s in art history and modern languages/literature had the highest, 2.5 and 2.3 percent, respectively. These findings are consistent with comparable figures from the 1981 survey. The reader should note, however, that although the unemployment rate for Ph.D.s in art history is high in comparison with other humanities subfields, the percentage has, in fact, decreased from the 1981 unemployment rate of 4.2 percent.

The distribution of males with doctorates in humanities by employment status did not vary appreciably by discipline. One exception to this was the low percentage of male art history Ph.D.s employed in

part-time jobs (2.7 percent) compared to other humanities subfields, where between 4.2 and 5.6 percent were working part-time.

However, there were considerable differences in the employment status of female Ph.D.s across fields. For example, only 73.4 percent of the music Ph.D.s and 74.2 percent of the Ph.D.s in classical languages/literature were employed in full-time jobs in contrast to 84.9 percent of Ph.D.s in English and American languages/literature. Women in music and classical languages/literature also reported the highest percentage of part-time employment (22.2 and 19.9 percent, respectively). Again, it is difficult to determine whether this high rate of part-time employment is attributable to a preference for part-time jobs or to their perception that there were no full-time jobs available for individuals with their training (14.2 percent of the music Ph.D.s and 15.3 percent of the classical languages/literature Ph.D.s



*Includes Alaska and Hawaii

NOTE: By region, Census Bureau estimates for the total U.S. population in 1983 are broken down as follows: New England, 5.3 percent; Middle Atlantic, 15.8 percent; East North Central, 17.7 percent; West North Central, 7.4 percent; South Atlantic, 16.6 percent; East South Central, 6.4 percent; West South Central, 11.0 percent; Mountain, 5.3 percent; and Pacific, 14.4 percent.

FIGURE 3-1 Regional distribution of U.S. humanities doctorates, 1983 (estimated population of 1940-1982 humanities Ph.D.s in the U.S. = 85,000 excluding 200 in U.S. possessions)

either reported that they were not seeking full-time jobs or gave no reason for being employed on a part-time basis).

Geographic Differences

Distribution of Ph.D. Population

For all regions[20] except the East South Central, there have only been minor shifts in the distribution of humanities Ph.D.s in the United States during the survey years. Figure 3-1 shows the number and percentage of Ph.D. humanists in the United States by region, regardless of employment status. The largest number of humanities Ph.D.s (15,700) was again found in the Middle Atlantic region, and the Mountain Region continued to be the area with the smallest number of humanities Ph.D.s (4,200). The percentage of Ph.D. humanists who reside in the East South Central region decreased from 5.5 percent in 1981 to 4.8 percent in 1983.

Employment Status

Table 3-6 provides the labor force status of this population by region. Excluding U.S. possessions, Ph.D.s in the East North Central and West South Central areas had the highest rate of full-time employ-

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[20]Regions by state are as follows: New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic (New Jersey, New York, Pennsylvania); East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota); South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia); East South Central (Kentucky, Alabama, Mississippi, Tennessee); West South Central (Arkansas, Louisiana, Oklahoma, Texas); Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming); Pacific (Alaska, California, Hawaii, Oregon, Washington).

TABLE 3-6 Employment and Unemployment of Humanities Ph.D.s in the

Labor Force Status	1983 Location (Region) All Regions	New England	Middle Atlantic	East North Central
Total Ph.D. Labor Force	77,900	7,400	14,600	12,900
Employed Full-Time	89.6	89.0	86.9	93.2
Employed Part-Time	7.3	7.8	9.8	4.8
Seeking Full-Time Employment	2.7	2.0	3.7	2.2
Not Seeking F-T Empl./No Rept.	4.6	5.8	6.1	2.6
Postdoctoral Appointment	1.4	1.7	1.3	0.5
Unemployed and Seeking Employ	1.7	1.4	2.0	1.5

NOTE: Regions by state are as follows: New England (Connecticut, Atlantic (New Jersey, New York, Pennsylvania); East North Central (Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Georgia, Maryland, North Carolina, South Carolina, Virginia, West Tennessee); West South Central (Arkansas, Louisiana, Oklahoma, Utah, Wyoming); Pacific (Alaska, California, Hawaii, Oregon,

ment and the lowest percentages both in part-time employment (4.8 and 3.2 percent, respectively) and on postdoctoral appointments (0.5 and 1.0 percent, respectively).

Ph.D.s in the Pacific Region reported the lowest rate of full-time employment (84.0 percent) and the highest rate of part-time employment (11.7 percent). Almost half (5.6 percent) of the Ph.D.s employed part-time in the Pacific Region were seeking to change their employment status to full-time employment. A less dramatic but similar employment picture was noted for humanities Ph.D.s in the Middle Atlantic Region, where only 86.9 percent of the 14,600 Ph.D.s in the region were employed in full-time jobs and 9.8 percent were employed in part-time positions. However, unlike the part-time employed Ph.D.s in the Pacific Region, two-thirds of the Middle Atlantic humanists were either not seeking full-time employment or gave no response regarding their employment goals.

The West South Central and Pacific regions had relatively high

U.S. Labor Force by Region, 1983 (in percent)

1983 Location (Region)						
West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	U.S. Possessions
6,400	12,800	3,800	6,000	3,600	10,200	200
90.5	91.2	91.3	93.0	90.4	84.0	94.1
6.4	6.1	6.5	3.2	6.4	11.7	3.2
1.1	2.7	2.2	3.8	3.2	5.6	
5.3	3.4	4.3	3.0	3.2	6.1	3.2
2.2	1.2	1.1	1.0	2.2	1.9	
0.8	1.4	1.1	2.7	0.9	2.4	2.7

Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central Dakota); South Atlantic (Delaware, District of Columbia, Florida, Virginia); East South Central (Kentucky, Alabama, Mississippi, Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Washington).

unemployment rates, 2.7 and 2.4 percent, respectively, while less than 1 percent of the humanities Ph.D.s in the West North Central and Mountain regions were unemployed but seeking employment.

Type of Employer by Field of Doctorate

Total Ph.D. Population

In 1983, approximately 75,500 of the 85,200 humanities Ph.D.s in the United States were employed in full-time or part-time jobs. Of this employed group, Table 3-7 shows that 82.9 percent were working in educational institutions (4-year colleges, universities, and medical schools, 2-year colleges, and elementary/secondary schools). This percentage has decreased slightly from 1981 (85.4 percent) and continues the downward trend from 1977 (86.6 percent in 1979 and 88.0

TABLE 3-7 Type of Employer of Ph.D.s (1940-1982 Graduates) in the Humanities by Field of Doctorate, 1983 (in percent)

Type of Employer	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population* (N)	75,500	18,300	2,100	5,300	3,200	6,000	20,100	1,700	13,100	5,700
Educational Inst.	82.9	79.9	77.3	83.2	85.7	82.5	85.3	82.6	85.9	77.8
4-Year College/ Univ. Med Sch.	74.8	70.4	76.4	74.7	78.3	75.9	76.3	77.4	78.6	70.1
2-Year College	5.1	5.9	0.9	5.3	6.0	4.6	6.3	1.1	3.3	4.8
Elem/Secondary Sch.	3.0	3.6		3.1	1.3	1.9	2.7	4.1	4.0	3.0
Business/Industry†	8.8	7.0	8.9	10.6	7.1	11.2	9.5	9.3	8.5	8.9
U.S. Government	2.1	5.0	2.5	0.6	0.1	1.9	0.7	0.6	1.3	2.4
State/Local Gov't	1.7	2.2	2.8	0.3	1.1	1.1	1.5	1.3	1.3	3.1
Hospital/Clinic	0.2	0.1	0.1	0.1	0.7	0.7	0.2		0.1	0.3
Other Non-Profit Org.	4.0	5.5	7.9	4.4	5.1	2.5	2.3	5.6	2.6	7.4
Other									0.2	
No Report	0.3	0.2	0.4	0.7	0.2		0.6	0.5	0.2	0.1

*Includes full-time and part-time employed only.
†Includes self-employed.

percent in 1977). Correspondingly, since 1981 there has been an increase in the percentage of Ph.D. humanists employed in all other employment sectors, with the greatest increase occurring in business/industry and in "other nonprofit organizations."

Approximately 9 of every 10 of the academically employed humanities Ph.D.s were working in 4-year colleges or universities. The proportions were similar across all humanities subfields. The second largest employment category in 1983 was business/industry, which employed 8.8 percent of the humanists. By field, business employed as few as 7.0 percent for (history Ph.D.s) and as many as 11.2 percent (for philosophy Ph.D.s).

Although only 3.8 percent of the humanists were employed by federal, state, and local governments, as many as 7.2 percent of the historians worked in government jobs. Art historians, on the other hand, had a relatively high percentage (7.9 percent) of employment in the category of "other nonprofit organizations."

Recent Graduates

As changes in employer demand usually affect hiring first, an examination of employment opportunities for recent labor force entrants gives early indication of shifts in the market. In 1983, only 75.8 percent of the 1977-1982 Ph.D.s (see Table 3-8) were employed in educational institutions. Of these academically employed Ph.D.s, about 90 percent worked in 4-year colleges or universities. Compared to the total group (Table 3-7), these recent Ph.D.s were more frequently employed in nonacademic employment categories, with business/industry attracting most (13.1 percent) of the more recent doctorates. This was true for each field, with the most notable being philosophy, where as many as 20.9 percent indicated they were working in business/industry in 1983. Recent Ph.D.s were less likely to be employed in 4-year colleges or universities than were the total 1940-1982 Ph.D.s. This is especially true in history, where only 48.7 percent were employed in 4-year institutions compared to 70.4 percent of the total. Recent history

TABLE 3-8 Type of Employer of Ph.D.s (1977-1982 Graduates) in the Humanities by Field of Doctorate, 1983 (in percent)

Type of Employer	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population* (N)	18,300	3,500	700	2,000	700	1,300	4,200	300	3,500	2,100
Educational Inst.	75.8	65.1	70.1	79.2	79.1	73.3	83.8	79.2	81.7	66.2
4-Year Coll/Univ/ Med Sch.	63.2	48.7	69.3	65.7	71.8	62.9	64.6	72.4	74.6	57.6
2-Year College	7.2	5.8	0.7	6.7	6.2	6.9	14.3	1.4	2.3	6.8
Elem/Secondary Sch.	5.4	10.6		6.8	1.1	3.4	4.9	5.4	4.8	1.8
Business/Industry†	13.0	13.0	11.4	13.2	12.3	20.9	10.4	15.8	12.8	14.1
U.S. Government	2.5	6.4	1.3	1.1		2.8	1.5		1.3	2.7
State/Local Gov't	2.3	5.1	3.2	0.6	1.8	1.8	1.2	1.4	1.2	3.7
Hospital/Clinic	0.3	0.6			1.6					0.9
Other Non-Profit Org.	5.8	9.7	13.1	5.4	5.3	1.2	2.5	3.6	2.5	12.3
Other	0.1								0.3	
No Report	0.3	0.1	0.9	0.5			0.5		0.2	

*Includes full-time and part-time employed only.
†Includes self-employed.

Ph.D.s were far more likely to work in elementary and secondary schools (nearly three times the percentage of the total), in business/industry (almost twice as likely as the total), and in "other non-profit organizations" (again, nearly twice as likely as the total).

Primary Work Activity by Field of Doctorate

Total Ph.D. Population

The distribution of doctorates among the various primary work activities gives an indication of how their specialized training is being utilized in response to labor market demands. The two most frequently reported work activities for humanities Ph.D.s in 1983 were teaching, 66.3 percent, and management/administration, 11.4 percent (Table 3-9). Teaching and management/administration were also the most frequently mentioned primary work activities of humanities Ph.D.s in previous survey years. In 1981, 69.7 percent of the humanities Ph.D.s reported teaching as their primary work activity, and 11.0 percent reported management/administration as their primary work activity. The comparable figures for 1979 were 65.1 percent for teaching and 13.2 percent for management/administration. However, the percentage of humanists primarily engaged in teaching has declined since 1981, a trend that supports the finding of an earlier report on "nontraditional" kinds of employment.[21]

As was true in past surveys, there was slight variation in the primary work activities reported by Ph.D.s across the various humanities subfields. Ph.D.s in speech/theater and modern languages/literature had the highest percentage of graduates engaged in teaching, 72.7 and 70.6 percent, respectively. History Ph.D.s, on the other hand, had

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[21]For detailed analysis, see Departing the Ivy Halls: Changing Employment Situations for Recent Ph.D.s, National Academy Press, Washington, D.C., 1983.

TABLE 3-9 Primary Work Activity of Full-Time and Part-Time Employed Ph.D.s (1940-1982 Graduates) in the Humanities by Field of Doctorate, 1983 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population* (N)	75,500	18,300	2,100	5,300	3,200	6,000	20,100	1,700	13,100	5,700
Teaching	66.3	61.6	62.8	67.2	72.7	65.8	68.7	65.5	70.6	61.0
Research and Development	4.4	5.7	5.8	1.6	2.0	6.9	2.3	8.4	3.5	9.4
Consulting/ Professional Services	3.6	3.6	2.7	1.4	2.8	4.9	3.7	4.3	3.6	4.3
Management/ Administration	11.4	14.2	9.5	9.9	11.5	10.2	11.6	8.1	7.9	13.1
Writing/Editing	5.1	6.3	5.1	1.6	2.0	4.4	6.5	4.0	4.9	3.0
Archival Work	0.5	1.1	0.5	0.4	0.1	0.3	0.2	0.2	0.3	0.1
Curatorial Work	0.4	0.4	7.6		0.1	0.1		0.3	0.2	0.3
Performing Arts	0.8			8.5	3.3					0.2
Other	4.4	4.4	3.8	4.3	3.4	4.9	4.1	6.4	4.4	5.3
No Report	3.2	2.7	2.4	5.0	2.2	2.5	2.9	2.7	4.6	3.1

*Includes full-time and part-time employed only.

one of the lowest percentages involved in teaching (61.6 percent), but the highest percentage who were engaged in management/administration work (14.2 percent).

Not surprisingly, curatorial work was a major primary work activity of the art historians (7.6 percent), and performing arts was a major primary work activity of 8.5 percent of the music Ph.D.s. These percentages compare to 0.4 percent for curatorial work and 0.8 percent for performing arts for all humanities fields combined.

Recent Ph.D.s

The most recent humanities Ph.D.s, who graduated in the period 1977-1982, had a pattern of work activities similar to that of the total. Almost two-thirds were engaged in teaching (64.1 percent); but given their younger age and fewer years of professional experience, a smaller percentage of this group than the 1940-1982 group (8.4 percent versus 11.4 percent) held management/administration positions (Table 3-10).

Only 54.0 percent of the recent graduates in history and 56.3 percent of the art history Ph.D.s were engaged primarily in teaching. For those history Ph.D.s not engaged in teaching, there was relatively even distribution throughout the various other work activities: 8.8 percent were involved in research and development, 6.5 percent in consulting, 8.2 percent in management/administration, 8.1 percent in writing/editing, and 8.8 percent in other nonspecified activities. For art history Ph.D.s, however, the distribution was concentrated more in curatorial work (13.9 percent), management/administration (7.8 percent), and writing (6.6 percent).

Salaries

Salary levels are, in part, determined by labor market conditions. The greater the demand relative to the supply, the more one would expect salaries to increase to attract potential employees. Salary levels are

TABLE 3-10 Primary Work Activity of Full-Time and Part-Time Employed Ph.D.s (1977-1982 Graduates) in the Humanities by Field of Doctorate, 1983 (in percent)

Primary Work Activity	Field of Doctorate									
	All Fields	History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population* (N)	18,300	3,500	700	2,000	700	1,300	4,200	300	3,500	2,100
Teaching	64.1	54.0	56.3	71.3	67.4	61.3	67.9	60.2	72.9	55.5
Research and Development	5.2	8.8	5.9	4.0	4.1	6.3	1.0	8.6	3.7	10.3
Consulting/ Professional Services	4.5	6.5	3.1	1.2	7.4	6.0	2.4	4.7	4.9	6.2
Management/ Administration	8.4	8.2	7.8	4.0	8.1	7.7	11.3	5.0	6.2	11.9
Writing/Editing	6.1	8.1	6.6	1.2	3.0	7.5	10.0	6.1	3.7	3.3
Archival Work	0.8	2.2	0.6	0.3			0.5	1.4	1.0	0.4
Curatorial Work	0.6		13.9					1.1	0.1	0.3
Performing Arts	1.3			9.5	6.1					
Other	6.4	8.8	4.3	5.7	3.2	7.2	5.1	11.1	5.1	8.5
No Report	2.7	3.4	1.5	3.0	0.7	4.0	1.8	1.8	2.5	3.6

*Includes full-time and part-time employed only.

also an important component of the art of providing society's scholarly activities. The estimated median annual salary for humanists employed full-time in 1983 (Table 3-11) was $30,700, an increase of 16.3 percent from that reported in 1981. As was the case for Ph.D.s in science and engineering fields, salaries have been growing at an increasing rate. The median salary in 1981 was 14.8 percent higher than that in 1979 while the 1979 figure was up only 8.5 percent from that of 1977. By field, history Ph.D.s had the highest median salary, $33,500, and the music Ph.D.s reported the lowest, $28,900.

By Sex

The median annual salary for male humanists was $31,900 while that for females was $26,800, a difference of over $5,000. Across all humanities fields, the average salary for male Ph.D.s was consistently higher than that for female Ph.D.s. The largest discrepancy, $6,400, occurred in the field of speech/theater. The field with the smallest discrepancy, $3,800, was modern languages/literature.

By Years Since Ph.D.

Salaries for humanists generally increased as the number of years since the Ph.D. increased.[22] A clear-cut pattern emerged, indicating that the median salaries for men and women grew more disparate as the number of years since receipt of doctorate increased. For example, for those with 5 or less years since receipt of the degree, averaged over all fields, men earned almost 4 percent more in salaries than

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[22]The one exception was for females in "other" humanities who were 16-20 years away from the time they had earned their degrees: their median salary actually decreased in relationship to cohorts with fewer years of experience. For the total group, a number of the humanities fields showed a decrease in median annual salary with increased time since Ph.D. receipt (i.e., 21+ years since degree receipt), but this is largely due to the fact that the number of sample members reporting salaries in these categories was small.

TABLE 3-11 Median Annual Salaries of Full-Time Employed Ph.D.s in the Humanities by Sex, Years Since Ph.D., and Field of Ph.D., 1983 (in thousands of dollars)

Sex and Years Since Ph.D.	Field of Doctorate									
	All Fields	History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
TOTAL	$30.7	$33.5	$30.3	$28.9	$34.0	$30.9	$30.0	$30.0	$29.7	$29.2
5 or less	23.3	23.8	23.3	24.1	25.3	24.5	22.8	21.6	22.3	23.9
6-10	27.7	29.1	29.0	28.2	28.9	27.6	26.5	26.2	27.1	28.7
11-15	32.7	34.7	33.8	32.9	34.6	31.0	31.4	30.4	31.1	31.1
16-20	36.4	36.9	40.0	38.4	37.7	36.7	34.3	37.1	36.7	39.4
21-25	40.1	45.2		34.5	36.7	40.7	40.7	39.2	39.6	
26-30	42.6	46.5				44.7	36.6		43.9	
Over 30	42.5	41.4					43.1	37.9		
Male, TOTAL	$31.9	$34.2	$32.5	$29.7	$35.0	$31.6	$31.3	$30.5	$30.7	$30.5
5 or less	23.7	23.6	24.0	24.4	26.9	25.1	22.9	21.5	22.5	24.1
6-10	28.4	29.6	30.0	28.8	29.4	28.0	27.3	26.4	27.7	29.2
11-15	33.1	34.7	34.3	33.5	34.8	31.2	31.9	30.5	31.2	30.8
16-20	36.5	36.9	39.9	39.1	38.4	36.9	33.5	37.8	38.1	
21-25	41.3	45.4				41.0	41.7		42.2	
26-30	42.8	46.8								
Over 30	43.0									
Female, TOTAL	$26.8	$28.9	$26.7	$25.1	$28.6	$27.2	$26.5	$26.2	$26.9	$26.4
5 or less	22.8	24.2	22.1	21.9	22.7	23.0	22.7	21.6	22.2	23.7
6-10	25.8	25.7	27.9	24.5	26.5	26.8	25.1	25.3	25.9	26.8
11-15	31.1	34.8	31.8	30.7	32.8	30.0	30.2		30.8	33.3
16-20	35.7	36.7		34.5		34.8	36.1		35.5	31.9
21-25	34.8								35.5	
26-30	35.9									
Over 30	38.4									

NOTE: Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multipled by 11/9 to adjust for a full-time scale. Medians were not reported for cells with less than 20 cases reporting salary, or with sampling error of ± $2,000.

women; for those with 11-15 years, the difference was over 6 percent; and for those with 21-25 years, the difference was over 18 percent.

By Type of Employer

Salaries of humanists employed full-time in 1983 varied among types of employer by almost 25 percent (Table 3-12). The range of variation, however, is reduced by about one-half (to almost 12.5 percent) when the small number who either reported "other" or did not report type of employer are excluded. Overall, 4-year colleges and universities provided the highest salaries for humanities Ph.D.s, $31,200. Humanities Ph.D.s employed by the goverment reported salaries that averaged $28,600, and those employed in business/industry (including self-employment) earned yearly salaries that averaged $27,800. Those Ph.D.s who either reported themselves as employed in "other" areas or gave no information regarding their employer earned the lowest median salary, $25,100.

By field and type of employer, music and speech/theater Ph.D.s working at 2-year colleges reported the highest salaries ($36,100 and $35,900, respectively). The lowest salaries were reported by music Ph.D.s employed by business/industry ($20,100).

Generally, the male humanities Ph.D.s earned higher salaries than the female humanities Ph.D.s when all types of employers were grouped. However, there were distinct differences by sex, field of doctorate, and the type of employer. For example, female history Ph.D.s employed in 2-year colleges and business/industry earned higher salaries than comparable male history Ph.D.s ($35,500 and $30,500, respectively, compared to $33,300 and $23,100 for men).

Academic Employment

The academic sector is undisputedly the most important provider of humanities scholarship; it is also the major producer of future gener-

TABLE 3-12 Median Annual Salaries of Full-Time Employed Ph.D.s in the
(in thousands of dollars)

Sex and Type of Employer	Field of Doctorate: All Fields	History	Art History	Music
TOTAL	$30.7	$33.5	$30.3	$28.9
Educational Institution	31.0	34.4	30.6	29.6
4-Year Coll/Univ/Med School	31.2	34.5	30.5	29.5
2-Year College	30.5	33.4		36.1
Elem/Secondary School	27.2	31.1		
Business/Industry*	27.8	24.5	25.5	20.1
Government	28.6	31.2	30.2	
Other/No Report	25.1	30.1	29.5	
Male, TOTAL	$31.9	$34.2	$32.5	$29.7
Educational Institution	32.6	34.9	32.6	30.3
4-Year Coll/Univ/Med School	32.7	35.1	32.5	30.2
2-Year College	30.9	33.3		
Elem/Secondary School	30.3			
Business/Industry*	27.3	23.1		
Government	30.1	31.3		
Other/No Report	28.3	30.9		
Female, TOTAL	$26.8	$28.9	$26.7	$25.1
Educational Institution	26.9	29.3	27.5	26.2
4-Year Coll/Univ/Med School	26.9	29.2	27.4	26.3
2-Year College	29.4	35.5		
Elem/Secondary School	24.2			
Business/Industry*	29.0	30.5		20.0
Government	25.7	28.7		
Other/No Report	19.9			

NOTE: Median salaries were computed only for Ph.D.s employed full- multipled by 11/9 to adjust for a full-time scale. Medians were not sampling error of ± $2,000.

*Includes self-employed.

ations of these scholars. It is useful, therefore, to examine its employment conditions more closely. Careful scrutiny of these conditions can provide clues about current and future career opportunities.

Humanities by Sex, Type of Employer, and Field of Doctorate, 1983

Field of Doctorate					
Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
$34.0	$30.9	$30.0	$30.0	$29.7	$29.2
34.2	31.2	30.5	30.5	29.8	29.3
34.0	31.3	30.8	30.7	29.9	28.3
35.9	30.3	28.0		33.7	35.6
		27.2		23.0	
	30.7	28.7	27.4	27.9	35.0
	35.0	24.0		31.9	
	28.4	14.0		22.1	26.6
$35.0	$31.6	$31.3	$30.5	$30.7	$30.5
35.0	32.0	32.0	30.9	30.8	30.5
34.9	32.3	32.3	30.9	30.9	30.1
	30.5	28.3			
				24.6	
	30.6	28.4		27.6	
				32.9	
					30.6
$28.6	$27.2	$26.5	$26.2	$26.9	$26.4
29.2	27.2	26.6	26.6	26.9	26.4
28.7	27.2	26.7	28.2	26.8	26.3
		26.6		38.4	
				22.5	
	31.5	29.2		28.5	
				19.2	

time, excluding those in the U.S. military. Academic salaries were reported for cells with less than 20 cases reporting salary, or a

Faculty Status and Rank

Since 1977, when humanities Ph.D.s were first included in the survey,

Table 3-13 Academic Position of Humanities Doctorates, 1977 and 1983

Academic Position	1977	1983
Total Reporting Position	49,700	59,000
Faculty	95.6	92.7
Professor	36.7	42.0
Associate Professor	30.5	31.5
Assistant Professor	25.7	16.9
Instructor	2.7	2.3
Nonfaculty	3.6	5.9
Postdoctoral Appointment	0.8	1.4

the proportion in faculty positions has declined while those for humanists in nonfaculty slots and on postdoctoral appointments have risen (Table 3-13). Controlling for those Ph.D.s not reporting their academic position, 92.7 percent of the 1983 population of humanities doctorates held faculty positions,[23] 5.9 percent were in nonfaculty positions, and another 1.4 percent were on postdoctoral appointments. In 1977 the corresponding figures were 95.6 percent, 3.6 percent, and 0.8 percent, respectively.

Although the proportion of humanists with faculty status has declined, some redistribution among the faculty ranks (i.e., professor, associate, assistant, and instructor) has occurred. Full professorships increased by 5.3 percentage points (from 36.7 percent in 1977 to 42.0 percent in 1983), and associate professorships increased by 1.0 percentage point (from 30.5 percent in 1977 to 31.5 percent in 1983). On the other hand, assistant professorships were down by 8.8 percentage

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[23]As in Chapter II, Ph.D.s who did not report their academic position were excluded from the percentage base for longitudinal comparison. Although the respective nonresponse levels for 1977 and 1983 were roughly equivalent for academically employed humanists (3.5 percent of 51,504 and 3.4 percent of 61,089), the exclusion was made for consistency. Figures presented in Table 3-14, which concentrates solely on the 1983 population, include all those who were academically employed.

points (from 25.7 percent in 1977 to 16.9 percent in 1983), and instructor positions were also down slightly, by 0.4 percentage points (from 2.7 percent in 1977 to 2.3 percent in 1983). These findings reflect the earlier faculty build-up of the 1960s and the limited number of tenure-track jobs for recent Ph.D.s. While there appeared to be some shift toward the upper end of the faculty ranks, a comparable redistribution did not appear to be taking place between nonfaculty and postdoctoral appointments and faculty positions.

By Years Since Ph.D.

Table 3-14 presents data on the percentage distribution of Ph.D.s who were working in colleges and universities in the United States in 1983 by field of Ph.D., year of Ph.D., sex, and academic position. The years in which the degrees were awarded are divided into four time frames: 1940-1959, 1960-1969, 1970-1975, and 1976-1982. For all four time frames, higher percentages of men than women had achieved the rank of full professor (1940-1959: 86.6 percent for men and 73.2 percent for women; 1960-1969: 69.0 percent and 53.6 percent; 1970-1975: 31.4 percent and 19.1 percent; 1976-1982: 9.0 percent and 4.3 percent). The two most recent cohorts, whose Ph.D.s are likely to be younger and less experienced, more frequently held intermediate or lower ranks. Given that, it is interesting to note that for these two time frames, men more frequently held associate professorships than did women (1970-1975: 50.7 percent for men and 45.5 percent for women; 1976-1982: 30.0 percent and 17.9 percent).

By Sex

Examining the gender variable for each cohort across the humanities fields, it was noted that in the 1940-1959 period, men in the field of English and American languages/literature had the highest percentage of full professorships (90.6 percent) while female Ph.D.s in this field had the lowest (70.7 percent), a disparity of nearly 20 percentage points. This disparity closed by nearly 7 percentage points for the

TABLE 3-14 Academic Position of Humanities Ph.D.s by Year of Doctorate, Field of Doctorate, and Sex, 1983 in percent

1983 Academic Position/ Year of Ph.D.	All Fields		Field of Doctorate/Sex: Eng/Amer Lit		History		Other Lang		Other Humn.	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total, 1940-1959 Ph.D.s (N)	6,900	900	1,700	300	2,200	200	1,100	200	1,900	200
Faculty	95.3	86.1	99.2	82.6	90.0	87.1	95.0	88.7	98.1	86.3
Professor	86.6	73.2	90.6	70.7	82.2	75.3	86.3	71.8	88.2	76.9
Associate Professor	8.5	10.0	8.6	8.5	7.8	11.8	8.7	13.2	9.1	5.5
Assistant Professor	0.2	2.4		3.5				1.9	0.8	3.8
Instructor		0.6						1.9		
Nonfaculty	1.5	1.9			3.5	1.1	0.6	4.1	1.0	2.2
Teaching Staff*	0.8	1.6			2.2	1.1	0.6	4.1	0.1	0.5
Research Staff+	0.6	0.3			1.2				0.9	1.6
Postdoctoral Appointment	0.8	0.3	0.4		1.3		2.1	1.1		
Other	2.1	9.6	0.4	14.3	5.2	8.1	2.2	6.0	0.1	9.9
No Report	0.2	2.0		3.1		3.8			0.8	1.6
Total, 1960-1969 Ph.D.s (N)	14,100	3,200	3,700	1,200	4,100	400	2,400	900	3,900	700
Faculty	93.5	87.2	90.0	83.2	97.6	89.2	92.9	87.6	92.9	92.1
Professor	69.0	53.6	67.2	54.3	76.6	52.7	58.3	45.7	69.4	62.9
Associate Professor	22.5	28.1	22.8	24.4	18.6	31.6	30.3	35.9	21.5	22.6
Assistant Professor	1.5	3.6		2.9	2.4	4.9	3.6	3.9	0.8	3.7
Instructor	0.5	1.9		1.6			0.8	2.2	1.2	3.0
Nonfaculty	1.8	1.6	2.9		0.7		2.4	2.7	1.5	4.0
Teaching Staff*	1.5	1.1	2.5		0.7		1.4	2.7	1.5	1.6
Research Staff+	0.3	0.5	0.4				1.0			2.4
Postdoctoral Appointment	1.5	1.0		1.4	0.8	1.8	1.3	0.5	3.8	0.3
Other	2.2	7.7	5.2	12.0		6.7	2.4	6.4	1.4	2.9
No Report	1.1	2.5	1.9	3.4	1.0	2.2	1.0	2.8	0.5	0.7

Total, 1970-1975 Ph.D.s (N)	14,600	5,400	3,800	1,900	3,800	800	2,600	1,500	4,400	1,200
Faculty	93.4	84.7	93.8	85.8	94.1	82.7	95.8	85.5	91.0	83.4
Professor	31.4	19.1	27.7	17.3	39.2	23.0	27.1	20.4	30.2	17.7
Associate Professor	50.7	45.5	55.2	47.1	46.9	39.6	53.7	44.8	48.4	47.5
Assistant Professor	9.5	16.4	9.6	19.0	4.9	12.9	13.0	15.2	11.1	16.4
Instructor	1.9	3.7	1.3	2.5	3.1	7.2	2.0	5.1	1.3	3.7
Nonfaculty	1.6	4.3	0.7	4.4	1.5	3.9	1.2	2.3	2.9	7.0
Teaching Staff*	1.3	2.8	0.7	2.7	0.7	3.3	1.0	1.5	2.4	4.2
Research Staff+	0.3	1.5		1.7	0.8	0.7	0.2	0.8	0.4	2.8
Postdoctoral Appointment	0.9	1.1	0.6	0.1	0.8	0.3	1.7	2.8	0.8	0.9
Other	3.0	7.6	3.4	7.5	2.9	11.0	1.4	7.3	3.6	6.0
No Report	1.1	2.3	1.6	2.2	0.7	2.1		2.2	1.7	2.7
Total, 1976-1982 Ph.D.s (N)	9,600	6,400	2,300	1,900	2,000	600	1,500	1,900	3,800	2,000
Faculty	86.6	76.3	82.7	74.5	82.8	79.9	87.8	75.4	90.5	77.8
Professor	9.0	4.3	11.2	6.4	11.9	0.3	3.9	2.9	8.2	4.7
Associate Professor	30.0	17.9	25.2	23.5	28.3	13.8	26.5	12.5	35.2	18.9
Assistant Professor	43.6	48.6	40.6	36.6	37.2	61.4	55.6	55.4	43.9	49.5
Instructor	4.1	5.6	5.7	8.0	5.5	4.3	1.8	4.5	3.3	4.7
Nonfaculty	3.5	4.8	2.8	5.2	5.8	1.7	2.3	6.1	3.3	4.1
Teaching Staff*	3.1	3.5	2.8	3.9	3.9	0.2	1.7	5.1	3.3	2.7
Research Staff+	0.5	1.3		1.3	1.9	1.5	0.6	1.0		1.4
Postdoctoral Appointment	1.1	3.4	1.1	1.3	1.5	1.7	2.2	4.5	0.3	4.7
Other	6.1	13.2	6.9	15.2	9.1	16.7	6.5	12.6	3.9	11.0
No Report	2.7	2.3	6.5	3.8	0.9		1.1	1.4	1.9	2.4

*Includes nonfaculty staff members whose primary work activity is teaching.
+Includes nonfaculty staff members whose primary work activity is basic research, applied research, development, or design.

NOTE: Other Languages & Literature = Classical Languages and Literature, and Modern Languages and Literature. Other Humanities = Art History, Music, Speech/Theater, Philosophy, and "Other" Humanities.

1960-1969 cohort, where 67.2 percent of the men and 54.3 percent of the women were full professors. During that period, the greatest gender disparity in full professorships occurred in history (76.6 percent for men and 52.7 percent for women). Nearly a third of the female historians in this cohort were associate professors. In the period of 1970-1975, the field of history still had the largest difference (16.2 percentage points) in full professorships between men and women (39.2 percent for men and 23.0 percent for women). Given the smaller portions of this group who rank as full professors, this difference is still relatively high.

The category with the smallest disparity, only 6.7 percentage points, was "other languages" (classical and modern foreign languages). Since the greatest portions of humanists earning their degree during 1970-1975 were employed as associate professors, it is relevant to examine those gender differences. The largest difference occurred in history, where 46.9 percent of the men and 39.6 percent of the women reported having the rank of associate professor in 1983. The smallest disparity occurred in the field of "other humanities," in which the proportions of men and women were roughly equivalent (48.4 percent and 47.5 percent, respectively).

For the most recent cohort (i.e., 1976-1982) the field of history again showed the greatest difference in the percentage of Ph.D.s holding the rank of full professor (11.9 percent for men and 0.3 percent for women), and the smallest difference for full professorship was found in "other languages" (3.9 percent for men and 2.9 percent for women). The largest difference, 16.3 percent, in the percentages of men and women ranked as associate professors was in "other humanities" (35.2 percent for men and 18.9 percent for women), with the field of history close behind in this disparity (35.2 percent for men and 18.9 percent for women, a 14.5 percentage point difference).

Tenure Status

The proportion of humanities Ph.D.s with tenure status has increased

from previous surveys. This corresponds to the increase in higher-ranking faculty positions noted in the previous section. Controlling for those academically employed Ph.D.s who did not report their tenure status, the proportion of tenured humanists in 1983 (75.0 percent) has risen 6.6 percentage points since 1979.[24] The corresponding decrease in nontenure positions was the tenure-track status category as follows: a 2.6 percentage point decrease from 1979 (14.8 percent) to 1983 (12.2 percent) in the share who report themselves to be nontenured but employed in tenure-track positions, a 2.4 percentage point decrease (from 11.4 percent in 1979 to 9.0 percent in 1983) in "not in tenure track" positions, and a 1.7 percentage point decrease for nontenured individuals whose track status was unknown.

Table 3-15 gives information on the tenure status of the academically employed humanities Ph.D.s. For each humanities field, male humanists continued to be more likely to have tenure than comparable females. Over three-fourths (77.2 percent) of the men were tenured, compared with only roughly one-half of the women (51.1 percent). Of the 39.4 percent of the female humanists who were not tenured, nearly one-half (16.5 percent) were not even in tenure-track positions. These findings were consistent across the various field categories, but most pronounced for the "46 or older" age group.

Not surprisingly, younger Ph.D.s (i.e., those age 35 or under) continue to have the highest share in nontenure positions (71.9 percent of the men and 74.2 percent of the women). Note, however, that the estimated proportion of nontenured women in this age group may be slightly understated. The 1983 estimate is considerably lower than re-

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[24]Longitudinal comparisons are made with data from 1979, when tenure track status was first probed (data from 1977 and 1979 differed only by 0.6 percentage points). Individuals from 1979 and 1983 who gave no report at all on their tenure status were excluded from the percentage base to allow for direct comparison between years. The nonresponse levels for tenure status in these years were 0.6 percent (of 53,676) in 1979 and 6.0 percent of (61,089) in 1983. Table 3-15, which concentrates solely on 1983 data, is based on all academically employed humanities Ph.D.s and includes "no report" figures.

TABLE 3-15 Tenure Status of Academically Employed Ph.D.s in the Humanities by Field of Doctorate, Age, and Sex, 1983 (in percent)

Age and Tenure	Field of Doctorate/Sex: All Fields Male	All Fields Female	Eng/Amer Lit Male	Eng/Amer Lit Female	History Male	History Female	Other Lang Male	Other Lang Female	Other Humn. Male	Other Humn. Female
Total Academically Employed (N)	45,300	15,800	11,600	5,200	12,100	2,000	7,700	4,500	13,900	4,100
Tenured	77.2	51.1	79.0	54.7	80.4	51.7	76.6	50.6	73.2	46.8
Not Tenured	17.9	39.4	16.3	34.3	16.1	39.0	18.5	40.2	20.3	45.1
Tenure Track	9.5	17.0	9.5	12.5	6.7	13.3	10.6	19.5	11.4	21.7
Non-Tenure Track	5.7	16.5	4.4	16.0	7.2	20.1	5.1	15.0	5.7	17.1
Type Position Unknown	2.6	5.9	2.4	5.8	2.2	5.6	2.8	5.7	3.2	6.3
No Report	4.9	9.5	4.6	11.0	3.5	9.2	4.8	9.1	6.5	8.0
Age - 35 or Under (N)	3,500	2,100	900	500	700	200	600	700	1,300	700
Tenured	18.5	12.6	15.8	23.1	17.4	3.3	18.0	9.9	21.3	10.7
Not Tenured	71.9	74.2	75.4	59.8	78.1	86.7	74.8	75.2	64.8	79.4
Tenure Track	48.8	45.5	68.1	25.7	21.5	52.3	48.1	54.2	49.8	49.1
Non-Tenure Track	13.4	22.3	0.3	32.2	37.5	27.8	19.0	13.4	7.2	22.0
Type Position Unknown	9.8	6.4	7.0	2.0	19.1	6.6	7.7	7.6	7.7	8.3
No Report	9.6	13.2	8.9	17.1	4.6	10.0	7.2	14.9	13.9	10.0
Age - 36 to 45 (N)	17,500	6,700	4,800	2,100	4,500	800	2,900	2,000	5,300	1,800
Tenured	71.8	46.4	79.5	48.3	72.2	50.5	70.9	46.1	64.9	42.8
Not Tenured	23.4	44.6	15.0	39.7	23.4	41.2	25.7	45.8	29.7	50.4
Tenure Track	12.7	19.5	7.2	14.9	12.4	13.3	15.7	22.4	16.4	24.5
Non-Tenure Track	7.9	17.9	5.4	15.8	10.4	22.6	6.8	16.8	8.7	19.4
Type Positoin Unknown	2.7	7.2	2.4	9.0	0.6	5.3	3.1	6.6	4.7	6.5
No Report	4.8	9.0	5.5	12.0	4.4	8.3	3.5	8.2	5.4	6.8
Age - 46 or Older (N)	24,200	6,900	5,800	2,500	6,900	900	4,200	1,900	7,300	1,600
Tenured	89.6	67.4	88.6	65.9	92.5	65.9	89.0	70.2	88.2	67.5
Not Tenured	6.0	23.8	8.1	25.1	4.6	24.2	5.6	21.9	5.9	23.8
Tenure Track	1.6	5.9	2.2	8.0	1.6	2.7	1.7	4.0	1.2	6.3
Non-Tenure Track	3.0	13.5	4.3	13.1	2.1	15.8	2.0	13.8	3.4	12.5
Type Position Unknown	1.4	4.5	1.6	4.1	0.8	5.7	1.9	4.1	1.4	5.0
No Report	4.4	8.8	3.3	9.0	2.9	9.9	5.5	8.0	5.9	8.7

NOTE: Other Languages & Literature = Classical Languages and Literature, and Modern Languages and Literature. Other Humanities = Art History, Music, Speech/Theater, Philosophy, and "Other" Humanities.

ported in 1981, 82.7 percent, or a decrease of 8.5 percentage points, while the proportion classified as "no report" increased 9.3 percentage points. This may reflect a change in the format of the tenure status question in the 1983 Survey instrument.[25] As a result of this change, individuals who were not tenured (and for whom tenure status may not have applied) may have failed to answer this question in 1983.

The smallest gender difference in tenure status was observed for this youngest age group (2.3 percentage points in the percent not tenured). A larger percentage of the women (in the field of English and American languages/literature) were tenured (23.1 percent, compared to 15.8 percent for men). This difference, however, not only reversed itself but widened for the older cohorts.

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[25]The 1983 survey form (see Appendix D, page 125) merely asked the respondent to verify tenure status information that was carried over from the 1981 survey.

APPENDIXES

APPENDIX A

SDR LONGITUDINAL DATA

TABLE A-1 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1983 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	350,900	18,500	2,500	28,100	45,000	12,000	55,000	16,900	12,900	57,600	47,500	55,100
Educational Institution	52.2	73.0	46.5	47.5	32.6	45.4	34.8	57.8	56.5	64.1	47.1	71.8
4-Year Coll/Univ/Med School	50.0	70.9	46.4	46.6	30.4	44.4	34.7	56.9	55.5	61.2	44.3	69.5
2-Year College	1.4	1.3	0.1	0.8	1.9	0.8	0.1	0.7	0.6	2.3	1.8	2.1
Elem/Secondary School	0.8	0.9		0.1	0.4	0.2		0.2	0.4	0.6	0.9	0.3
Business/Industry+	31.7	19.2	47.7	36.3	57.3	30.0	54.2	22.4	24.2	18.0	27.5	12.8
Government	9.7	5.3	4.3	11.1	6.6	21.2	7.7	16.5	10.0	10.8	8.4	10.2
Non-Profit Organization	3.1	1.8	1.4	4.1	2.2	2.9	2.6	2.2	3.1	3.6	4.1	3.3
Other	3.1	0.3		0.9	0.9	0.2	0.3	0.7	5.9	3.4	12.7	1.7
No Report	0.2	0.4	0.1	0.2	0.3	0.4	0.2	0.4	0.4	0.2	0.2	0.2

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-2 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1981 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	326,300	17,500	2,100	26,700	43,200	11,200	52,400	15,900	9,800	54,000	42,400	51,000
Educational Institution	53.3	73.9	43.1	49.6	34.1	46.9	33.5	57.8	59.1	65.6	50.1	73.9
4-Year Coll/Univ/Med School	51.2	71.7	42.9	48.5	31.8	45.6	33.4	56.7	58.2	63.3	48.4	71.4
2-Year College	1.4	1.6	0.2	0.9	1.9	0.9		0.9	0.6	2.0	2.0	1.8
Elem/Secondary School	0.7	0.6		0.2	0.4	0.3		0.1	0.3	0.3	3.3	0.7
Business/Industry+	29.9	17.8	47.0	33.1	56.4	27.3	54.1	21.2	21.4	15.4	23.6	9.7
Government	9.8	5.8	7.6	11.4	6.2	21.9	8.1	17.8	10.4	11.4	7.9	10.1
Non-Profit Organization	3.6	1.9	2.3	4.6	2.5	3.6	3.8	2.3	2.8	3.9	3.9	4.2
Other	3.2	0.3		1.1	0.7	0.1	0.5	0.7	6.0	3.5	14.4	1.7
No Report	0.2	0.3		0.1		0.3	0.1	0.2	0.3	0.2	0.1	0.4

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-3 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1979 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	297,100	16,400	1,600	25,100	41,500	10,000	47,400	14,800	9,100	49,400	36,600	45,200
Educational Institution	54.4	76.4	44.1	51.2	34.3	47.7	35.6	57.5	59.7	66.2	51.2	75.9
4-Year Coll/Univ/Med School	52.3	74.3	44.1	49.9	32.0	46.7	35.4	55.3	58.6	63.9	46.0	73.8
2-Year College	1.4	1.7		1.0	1.9	0.9	0.2	1.5	0.8	2.1	1.7	1.5
Elem/Secondary School	0.7	0.4		0.3	0.4	0.1		0.2	0.3	0.3	3.4	0.6
Business/Industry+	27.5	14.9	44.7	30.1	55.1	24.8	50.4	20.1	19.5	13.8	18.9	7.2
Government	10.5	6.0	6.9	12.6	6.3	23.3	9.4	19.4	10.6	11.6	8.9	10.1
Non-Profit Organization	3.6	2.3	2.9	4.4	2.8	3.1	4.0	2.3	3.5	3.5	4.6	4.2
Other	3.5	0.3	1.3	1.0	1.2	1.0	0.4	0.3	6.1	4.3	15.6	2.1
No Report	0.5	0.1		0.7	0.4	0.1	0.3	0.3	0.6	0.6	0.7	0.5

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-4 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1977 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	268,300	15,000	1,200	23,600	39,200	8,800	42,800	13,400	7,800	44,600	31,500	40,300
Educational Institution	56.3	80.0	52.5	53.9	35.4	51.7	37.1	58.4	58.8	67.5	53.9	78.9
4-Year Coll/Univ/Med School	54.0	77.8	51.3	52.2	32.7	50.3	36.6	57.2	57.7	64.3	48.3	76.5
2-Year College	1.6	1.8	0.6	1.6	2.2	1.2	0.5	1.1	0.6	2.1	1.9	1.9
Elem/Secondary School	0.7	0.3		0.1	0.5	0.2			0.6	0.4	3.1	0.5
Business/Industry+	26.3	12.4	37.5	28.4	53.9	22.5	48.7	18.5	19.7	13.2	16.1	6.6
Government	10.3	4.8	6.2	11.7	6.5	22.7	10.3	20.6	11.3	11.4	9.3	8.5
Non-Profit Organization	3.3	1.9	3.8	4.8	2.9	2.0	3.4	1.8	3.3	3.1	3.8	3.8
Other	3.3	0.2		0.7	0.9	0.5	0.2	0.5	6.0	4.2	16.4	1.5
No Report	0.5	0.6		0.4	0.4	0.5	0.2	0.3	0.9	0.6	0.5	0.6

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-5 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1975 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	243,300	14,000	900	21,800	37,600	8,000	39,000	12,200	6,500	41,600	27,400	34,500
Educational Institution	57.2	82.4	57.2	54.4	35.8	53.7	37.8	61.5	55.3	68.5	56.7	80.4
4-Year Coll/Univ/Med School	55.2	80.8	57.2	52.6	33.1	52.3	37.3	60.7	54.5	66.2	53.2	78.5
2-Year College	1.4	1.4		1.5	2.0	1.1	0.4	0.7	0.7	1.9	1.4	1.4
Elem/Secondary School	0.7	0.5		0.3	0.7	0.2			0.1	0.4	2.1	0.5
Business/Industry+	26.3	11.1	31.8	28.1	54.3	21.7	49.1	16.5	23.0	12.8	14.0	6.3
Government	10.1	4.4	8.8	12.2	6.2	21.7	9.7	20.0	13.3	11.8	8.7	8.4
Non-Profit Organization	3.2	1.8	2.1	4.7	2.7	2.9	3.1	1.3	2.6	3.2	4.0	3.5
Other	3.1	0.3		0.5	0.8	0.1	0.2	0.5	5.9	3.5	16.5	1.4
No Report	0.1			0.1	0.2		0.1	0.3		0.1	0.1	0.2

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-6 Type of Employer of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1973 (in percent)

Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astron	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	209,700	12,000	600	19,700	34,300	6,900	33,200	10,500	5,400	37,200	22,100	27,800
Educational Institution	57.8	84.5	56.4	52.0	36.5	54.9	39.0	63.5	57.5	68.8	58.6	82.4
4-Year Coll/Univ/Med School	55.9	83.6	55.0	50.3	34.2	53.5	38.4	62.3	55.6	66.9	54.6	80.8
2-Year College	1.3	0.7	1.4	1.4	1.8	1.3	0.5	1.1	0.7	1.6	1.8	1.2
Elem/Secondary School	0.6	0.2		0.3	0.5	0.1	0.1	0.1	0.3	0.3	2.3	0.4
Business/Industry+	25.2	8.5	28.7	26.7	52.6	20.9	46.6	13.8	21.6	11.6	12.9	5.8
Government	11.1	5.0	12.8	15.4	7.1	21.3	10.1	21.0	12.4	12.5	12.1	7.6
Non-Profit Organization	3.5	1.9	2.1	5.4	3.0	2.4	3.8	1.2	3.7	3.5	4.7	3.3
Other	2.3	0.2		0.5	0.6	0.4	0.3	0.2	4.6	3.3	11.5	0.8
No Report	0.1			0.1	0.2		0.1	0.1	0.1	0.2	0.2	0.1

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-7 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1983 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	350,900	18,500	2,500	28,100	45,000	12,000	55,000	16,900	12,900	57,600	47,500	55,100
Teaching	29.8	52.4	27.0	21.7	19.3	26.6	20.8	20.2	24.9	28.4	26.1	53.2
Research and Development	32.7	25.1	48.8	48.5	42.5	41.7	38.7	41.7	31.7	42.3	13.3	14.9
Consulting/Professional Serv.	10.6	5.0	5.4	3.2	4.2	6.8	7.6	6.4	14.6	6.1	40.5	4.7
Management/Administration	17.3	11.5	15.4	17.7	21.9	15.3	24.6	18.7	19.4	13.3	13.0	15.6
Writing/Editing	2.1	0.6	0.8	1.5	1.9	2.5	1.2	1.9	1.9	1.6	2.3	4.2
Other	5.4	2.3	1.9	4.7	8.4	5.6	5.9	8.7	5.3	5.4	3.4	4.9
No Report	2.1	3.2	0.7	2.6	1.8	1.6	1.2	2.5	2.3	2.8	1.4	2.4

*Excludes postdoctoral appointees.

TABLE A-8 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1981 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	326,300	17,500	2,100	26,700	43,200	11,200	52,400	15,800	9,800	54,000	42,400	51,000
Teaching	31.3	54.8	23.6	24.2	21.5	28.2	20.1	20.0	26.1	30.6	28.4	55.4
Research and Development	33.7	24.8	51.0	49.4	41.5	40.7	41.6	42.1	33.1	43.8	14.3	14.4
Consulting/Professional Serv.	10.2	5.2	7.0	3.5	4.7	8.3	8.2	5.9	12.7	6.1	37.7	5.1
Management/Administration	18.2	10.7	17.5	18.6	24.5	16.4	24.9	20.1	21.4	13.3	14.8	15.5
Writing/Editing	1.0	0.6	0.1	0.7	0.7	1.3	0.6	1.0	0.7	0.8	0.8	2.3
Other	4.5	3.1	0.8	2.7	6.3	4.0	4.2	8.7	4.6	4.1	2.9	5.3
No Report	1.2	0.8		1.0	0.9	1.1	0.4	2.2	1.3	1.3	1.1	2.0

*Excludes postdoctoral appointees.

TABLE A-9 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1979 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	297,100	16,400	1,600	25,100	41,500	10,000	47,400	14,800	9,100	49,400	36,600	45,200
Teaching	30.0	53.1	27.3	22.8	20.7	28.0	19.4	18.2	25.9	29.5	26.8	53.5
Research and Development	30.5	25.3	47.0	44.9	35.3	37.5	35.3	36.8	25.9	40.5	13.5	14.4
Consulting/Professional Serv.	8.5	3.7	2.4	3.3	3.1	5.8	6.2	4.9	11.4	4.4	36.2	3.8
Management/Administration	23.8	14.0	18.9	23.3	31.8	20.8	32.4	29.1	29.3	18.5	18.9	18.8
Writing/Editing	1.7	0.4	0.7	1.3	1.3	3.1	0.8	2.1	1.6	1.8	1.6	3.5
Other	4.2	2.3	2.9	3.1	6.7	4.1	5.1	7.3	3.4	3.9	1.6	4.1
No Report	1.3	1.3	0.8	1.3	1.1	0.7	0.9	1.6	2.5	1.4	1.3	1.9

*Excludes postdoctoral appointees.

TABLE A-10 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1977 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	268,300	15,000	1,200	23,600	39,200	8,800	42,800	13,400	7,800	44,600	31,500	40,300
Teaching	32.6	57.7	35.9	26.8	21.2	33.0	21.2	21.3	27.1	33.1	31.3	55.0
Research and Development	31.4	23.1	40.9	45.1	39.4	35.4	39.0	37.5	26.9	37.5	13.2	15.9
Consulting/Professional Serv.	6.6	2.1	4.0	1.8	2.3	3.6	4.1	5.3	10.2	3.5	30.6	3.0
Management/Administration	22.1	12.2	13.7	21.1	28.3	19.8	30.7	23.1	28.8	18.6	18.7	17.1
Writing/Editing	1.8	1.4	1.9	1.1	1.3	2.2	0.8	3.2	1.4	2.2	2.1	3.1
Other	3.3	2.0	0.6	3.0	5.7	3.6	2.9	6.9	3.3	2.9	1.9	2.7
No Report	2.1	1.6	3.1	1.2	1.8	2.4	1.3	2.7	2.3	2.2	2.1	3.2

*Excludes postdoctoral appointees.

TABLE A-11 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1975 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	243,300	14,000	900	21,800	37,600	8,000	39,000	12,200	6,500	41,600	27,400	34,500
Teaching	36.5	63.3	33.7	30.4	24.5	36.5	24.0	21.6	30.0	37.7	37.1	61.0
Research and Development	30.8	20.3	47.3	44.6	36.8	34.6	39.5	41.9	27.6	36.5	12.4	12.9
Consulting/Professional Serv.	6.0	2.4	1.5	1.6	2.1	3.4	4.3	5.0	9.5	3.4	27.8	2.6
Management/Administration	20.9	11.2	15.0	18.9	29.0	19.6	27.4	21.0	26.4	16.3	18.6	16.6
Writing Editing	0.6	0.1		0.2	0.7	1.1	0.4	0.6	0.2	0.8	0.5	1.1
Other	2.9	1.0	2.3	2.2	5.1	2.1	2.7	6.4	2.7	2.4	1.6	2.5
No Report	2.4	1.7	0.2	2.2	1.8	2.6	1.7	3.6	3.5	2.9	1.9	3.2

*Excludes postdoctoral appointees.

TABLE A-12 Primary Work Activity of Science and Engineering Ph.D.s in the United States by Field of Doctorate, 1973 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric Sci	Med Sci	Biol Sci	Psych	Social Sci
Employed Population*	209,700	12,000	600	19,700	34,300	6,900	33,200	10,500	5,400	37,200	22,100	27,800
Teaching	36.9	64.0	43.3	32.5	25.0	37.7	26.8	20.6	29.5	37.2	36.8	61.9
Research and Development	31.4	22.1	40.8	43.8	37.3	33.2	38.0	43.8	27.4	37.1	14.3	13.1
Consulting/Professional Serv.	4.9	2.1	1.4	1.3	1.9	2.6	3.3	3.9	9.0	2.6	24.1	2.2
Management/Administration	21.5	9.8	11.6	18.4	28.7	20.5	27.0	23.4	28.3	18.2	20.5	16.7
Writing/Editing	0.6	0.1		0.4	0.8	0.5	0.3	0.6	0.5	0.5	0.6	0.9
Other	3.1	0.8	1.6	2.1	4.8	4.4	3.4	5.7	2.6	2.6	1.7	2.7
No Report	1.7	1.0	1.4	1.4	1.5	1.1	1.1	2.0	2.7	1.8	1.9	2.4

*Excludes postdoctoral appointees.

TABLE A-13 Type of Employer of Humanities Ph.D.s in the United States by Field of Doctorate, 1983 (in percent)

Type of Employer	All Fields	History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
					Field of Doctorate					
Employed Population*	75,500	18,300	2,100	5,300	3,200	6,000	20,100	1,600	13,100	5,700
Educational Institution	82.9	79.9	77.3	83.2	85.7	82.5	85.3	82.6	85.9	77.8
4-Year Coll/Univ/Med School	74.8	70.4	76.4	74.1	78.3	75.5	78.3	77.4	78.6	70.1
2-Year College	5.1	5.9	0.9	5.3	6.0	4.6	6.3	1.1	3.3	6.8
Elem/Secondary School	3.0	3.6		3.1	1.3	1.9	2.7	4.1	4	0.9
Business/Industry+	8.8	7.0	8.9	10.6	7.1	11.2	9.5	9.3	8.5	8.9
Government	3.7	7.2	5.3	1.0	1.2	3.0	2.2	1.9	2.6	5.5
Non-Profit Organization	4.0	5.5	7.9	4.4	5.1	2.5	2.3	5.6	2.6	7.4
Other	0.3	0.1	0.1	0.1	0.7	0.7	0.2		0.3	0.3
No Report	0.3	0.2	0.4	0.7	0.2		0.6	0.5	0.2	0.1

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-14 Type of Employer of Humanities Ph.D.s in the United States by Field of Doctorate, 1981 (in percent)

Type of Employer	All Fields	History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
					Field of Doctorate					
Employed Population*	70,400	17,600	1,800	4,700	2,800	6,000	19,400	1,600	12,600	4,200
Educational Institution	85.3	80.8	81.6	84.6	86.8	86.8	87.8	83.5	88.6	82.8
4-Year Coll/Univ/Med School	77.6	71.6	75.8	77.8	80.2	81.9	79.4	75.8	80.8	75.1
2-Year College	4.9	6.1	1.4	4.7	4.9	3.9	5.6	0.9	3.9	3.9
Elem/Secondary School	2.8	3.2	0.4	2.1	1.6	1.0	2.8	6.7	4.0	3.8
Business/Industry+	6.5	5.6	5.6	7.4	5.4	6.5	8.0	7.3	6.1	5.3
Government	3.7	7.2	4.5	1.4	1.7	2.5	2.2	1.4	2.6	6.1
Non-Profit Organization	3.6	5.0	7.2	6.0	3.8	3.1	1.7	7.2	2.0	5.8
Other	0.2	0.2	0.3		0.6	0.8			0.3	
No Report	0.6	1.1	0.7	0.7	1.7	0.4	0.3	0.6	0.5	

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-15 Type of Employer of Humanities Doctorate Recipients in the United States by Field of Doctorate, 1979 (in percent)

Type of Employer	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	63,700	15,900	1,600	4,100	2,700	5,200	17,800	1,500	11,300	3,700
Educational Institution	86.3	81.0	84.4	86.4	89.8	86.3	89.1	83.9	90.5	81.5
4-Year Coll/Univ/Med School	79.3	72.5	83.7	79.4	82.5	80.2	82.9	76.2	83.0	74.3
2-Year College	4.3	5.6	0.6	4.7	5.9	4.8	4.3	0.5	3.1	3.5
Elem/Secondary School	2.6	2.8	0.1	2.4	1.4	1.4	1.9	7.2	3.6	3.7
Business/Industry+	5.4	4.5	4.6	4.9	4.5	5.5	7.3	5.4	4.5	4.5
Government	2.8	5.5	1.2	0.9	0.4	1.7	1.8	1.3	1.4	7.4
Non-Profit Organization	3.6	5.4	0.5	6.7	3.7	4.7	1.1	7.7	2.2	6.5
Other	1.0	2.5	8.3	0.2	0.8	0.6			0.4	0.3
No Report	0.9	1.1	1.0	0.9	0.9	1.1	0.8	1.2	1.1	0.2

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-16 Type of Employer of Humanities Ph.D.s in the United States by Field of Doctorate, 1977 (in percent)

Type of Employer	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	58,400	15,000	1,300	3,500	2,900	4,800	16,200	1,400	9,900	3,300
Educational Institution	89.9	85.6	86.8	91.7	90.5	91.2	93.0	88.4	91.4	87.2
4-Year Coll/Univ/Med School	82.4	76.9	86.0	82.8	84.7	85.1	85.5	80.8	84.0	81.2
2-Year College	5.1	6.0	0.6	5.9	5.0	5.3	5.6*	2.9	3.8	4.3
Elem/Secondary School	2.4	2.7	0.2	3.0	0.8	0.8	2.0	4.7	3.6	1.1
Business/Industry+	3.2	3.2	1.7	3.2	3.4	2.9	3.2	4.1	3.3	3.6
Government	2.5	5.2	0.5	0.1	1.9	1.4	1.5	2.0	1.6	3.6
Non-Profit Organization	2.4	2.6	1.8	3.8	3.5	3.0	1.5	5.1	2.0	3.6
Other	1.2	2.7	9.0	0.2	0.4	0.8			0.8	0.9
No Report	0.7	0.7	0.2	1.0	0.2	0.7	0.7	0.4	0.9	1.2

*Excludes postdoctoral appointees.
+Includes self-employed.

TABLE A-17 Primary Work Activity of Humanities Ph.D.s in the United States by Field of Doctorate, 1983 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	75,500	18,300	2,100	5,300	3,200	6,000	20,100	1,600	13,000	5,700
Teaching	66.3	61.6	62.8	67.2	72.7	65.8	68.7	65.5	70.6	61.0
Research and Development	4.4	5.7	5.8	1.6	2.0	6.9	2.3	8.4	3.5	9.4
Consulting/Professional Serv.	3.6	3.6	2.7	1.4	2.8	4.9	3.7	4.3	3.6	4.3
Management/Administration	11.4	14.2	9.5	9.9	11.5	10.2	11.6	8.1	7.9	13.1
Writing/Editing	5.1	6.3	5.1	1.6	2.0	4.4	6.5	4.0	4.9	3.0
Other	6.0	5.9	11.8	13.2	6.8	5.3	4.3	7.0	4.9	6.0
No Report	3.2	2.7	2.4	5.0	2.2	2.5	2.9	2.7	4.6	3.1

*Excludes postdoctoral appointees.

TABLE A-18 Primary Work Activity of Humanities Ph.D.s in the United States by Field of Doctorate, 1981 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	70,400	17,600	1,800	4,700	2,800	5,700	19,400	1,600	12,600	4,200
Teaching	69.8	64.5	70.6	69.5	70.3	72.4	71.8	66.9	75.7	62.1
Research and Development	3.9	6.6	3.6	1.3	0.7	4 7	2.1	8.0	3.4	4.8
Consulting/Professional Serv.	2.8	3.0	2.6	1.2	2.9	4.5	2.8	3.6	2.2	2.2
Management/Administration	11.1	11.4	7.0	10.5	11.6	10.8	12.9	5.5	7.1	18.4
Writing/Editing	4.2	5.8	2.4	1.0	1.4	2.6	5.0	3.5	3.3	4.5
Other	6.0	6.1	10.7	14.2	9.3	3.2	3.6	10.2	5.8	6.5
No Report	2.2	2.6	3.2	2.3	3.9	1.8	1.6	2.3	2.6	1.4

*Excludes postdoctoral appointees.

TABLE A-19 Primary Work Activity of Ph.D.s in the United States by Field of Doctorate, 1979 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	63,700	15,900	1,600	4,100	2,700	5,200	17,800	1,500	11,300	3,700
Teaching	65.6	57.3	65.6	65.8	64.2	67.1	71.2	66.3	68.5	64.1
Research and Development	5.2	8.5	5.4	2.9	1.5	4.8	1.7	7.5	6.4	8.5
Consulting/Professional Serv.	2.3	2.5	1.0	1.6	1.9	4.8	2.4	2.8	1.8	0.6
Management/Administration	12.9	15.3	9.9	12.1	15.8	11.6	11.9	11.1	10.3	17.4
Writing/Editing	5.4	6.6	4.1	1.1	1.5	4.9	7.6	4.1	3.3	5.8
Other	5.1	5.0	10.0	13.1	12.6	3.3	3.4	3.4	4.2	2.2
No Report	3.6	4.8	4.0	3.4	2.4	3.6	1.8	4.9	5.5	1.3

*Excludes postdoctoral appointees.

TABLE A-20 Primary Work Activity of Humanities Ph.D.s in the United States by Field of Doctorate, 1977 (in percent)

Primary Work Activity	All Fields	Field of Doctorate: History	Art History	Music	Speech/ Theater	Philosophy	English/ American Lang&Lit	Classical Lang&Lit	Modern Lang&Lit	Other Humn
Employed Population*	58,400	15,000	1,300	3,500	2,900	4,800	16,200	1,400	9,900	3,300
Teaching	69.5	65.5	67.6	73.2	67.1	67.3	72.6	68.0	74.2	60.9
Research and Development	5.3	7.0	6.7	1.7	4.0	7.0	3.8	8.8	4.1	9.9
Consulting/Professional Serv.	2.1	3.2	0.5	1.5	1.9	2.3	1.4	1.7	2.0	1.7
Management/Administration	10.9	11.2	13.2	11.1	17.5	10.9	10.7	9.7	8.1	13.1
Writing/Editing	4.8	6.0	4.4	2.4	1.9	5.0	5.6	3.2	3.3	4.6
Other	3.4	3.4	6.4	6.1	4.6	2.8	2.5	3.2	3.4	3.6
No Report	4.0	3.7	1.3	4.0	3.0	4.9	3.3	5.5	5.0	6.3

*Excludes postdoctoral appointees.

APPENDIX B

1983 SURVEY OF DOCTORATE RECIPIENTS QUESTIONNAIRE/SPECIALTIES LIST
AND
1983 ABBREVIATED QUESTIONNAIRE/CODING SHEET
AND
1983 POSTCARD QUESTIONNAIRE

1983 SURVEY OF DOCTORATE RECIPIENTS

OMB No.

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION, THE NATIONAL ENDOWMENT FOR THE HUMANITIES, THE NATIONAL INSTITUTES OF HEALTH, AND THE DEPARTMENT OF ENERGY

If your name or address is incorrect, please enter correct information below.

_____

_____

_____ (10-11)

Listed below are responses that you provided to us in previous NRC doctoral surveys. Please check this information to determine if it accurately reports your status as of FEBRUARY 1983. If the data are correct, simply check the "no change" box. If the data are missing or no longer correct, please enter the correct information in the spaces provided.

Previous Survey Response	No Change	Changes as of February 1983
Date of Birth	☐	_____ (12-16)
Institution/Year of Doctorate	☐	_____ (17-24)
Citizenship	☐	_____ (25)
Marital Status	☐	_____ (26)
Academic Rank	☐	_____ (27)
Tenure Status	☐	_____ (28-31)

What is your racial background?

1 ☐ American Indian or Alaskan Native
2 ☐ Asian or Pacific Islander
3 ☐ Black
4 ☐ White (32)

Is your ethnic heritage Hispanic?

A ☐ Yes
B ☐ No (33)

If YES, is it:
1 ☐ Mexican-American
2 ☐ Puerto Rican
3 ☐ Other Hispanic (34)

1. What was your employment status (includes postdoctoral appointment*) during February 1983?

☐ Circle your selection and enter number from below (35)

1. Employed full-time (35 hours or more/week in one position) (Skip to Question #3)
2. Employed part-time
   If you were employed part-time, were you seeking full-time employment?
   A ☐ Yes
   B ☐ No (36)
3. Postdoctoral appointment*
   If you held a postdoctoral appointment, was it
   A ☐ Full-time (Skip to Question #3)
   B ☐ Part-time (37)
4. Unemployed and seeking employment
5. Not employed and not seeking employment
6. Retired and not employed

(Skip to Question #11)

7. Other, specify _____

*Temporary appointment in academia, industry or government, the primary purpose of which is to provide for continued education or experience in research.

2. If you were employed part-time during FEBRUARY 1983, what was the MOST important reason for being in part-time status?

☐ Enter number from below (38)

1. Part-time employment preferred
2. Full-time position not available
3. Constraints due to family or marital status
4. Other, specify _____

3. Please give the name of your principal employer (company, organization, postdoctoral institution, etc. or, if self employed, write "self") and actual place of employment during FEBRUARY 1983.

_____
Name of Employer (39-46)

_____
City State ZIP (47-55)

4. From the Employment Specialties List on page 4 select and enter both the number and title of the employment specialty most closely related to your principal employment or postdoctoral appointment during FEBRUARY 1983. Write in your specialty if it is not on the list.

Number _____ Title of Employment Specialty _____ (56-58)

5. Which category below best describes the type of your principal employment OR postdoctoral appointment during FEBRUARY 1983?

☐ Enter number from below (59-60)

1. Business or industry (including self-employed)
2. Junior college, 2-year college, technical institute
3. Medical school (including university affiliated hospital or medical center)
4. 4-year college
5. University, other than medical school
6. Elementary or secondary school system
7. Private foundation
8. Hospital or clinic
9. U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA
10. U.S. government, civilian employee
11. State government
12. Local or other government, specify _____
13. Nonprofit organization, other than those listed above
14. Other, specify _____

6. What is your best estimate of the percentage of your professional work time that you devoted to each of the following activities during a typical week in your principal job? (Total should equal 100%)

	%		%
1.	____ Teaching (61)	11.	____ Operations—production, maintenance, construction, installation (10)
2.	____ Basic research (63)	12.	____ Quality control, testing, evaluation (12)
3.	____ Applied research (65)	13.	____ Sales, marketing, purchasing, estimating (14)
4.	____ Development of equipment, products, systems, data (67)	14.	____ Archival work (16)
5.	____ Design (69)	15.	____ Curatorial work (18)
6.	____ Writing, editing (71)	16.	____ Performing arts (20)
7.	____ Professional services to individuals (73)	17.	____ Other, specify _____ (22)
8.	____ Management of R&D (75)	TOTAL = 100%	
9.	____ Management of educational/other programs (77)		
10.	____ Consulting (79)		

a. **What were your primary and secondary work activities?** (Enter number 1-17 from question #6 above) ☐ Primary (24-25) ☐ Secondary (26-27)

7. What was the basic annual salary* associated with your principal professional employment during FEBRUARY 1983? If you were on a postdoctoral appointment (see question #1 for definition), what was your stipend plus allowances? $_____ per year (28-30)

Check whether salary was for ☐ 9-10 months or ☐ 11-12 months (31)

*Basic salary is your annual salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, or other payment for professional work.

8. If you were employed during FEBRUARY 1983 in a specialty field other than your field of Ph.D., what was the MOST important reason for being in that position?

☐ Enter number from below (32)

1. Better pay
2. More attractive career options
3. Preferred specific geographic location
4. Constraints due to family or marital status
5. Position in Ph.D. field not available
6. Promoted into new field
7. Other, specify _____

9. If you were employed in a non-academic job in FEBRUARY 1983, what was the MOST important reason for your decision to enter this job?

☐ Enter number from below (33)

1. Better pay
2. More attractive career options
3. Preferred specific geographic location
4. Constraints due to family or marital status
5. Academic position not available
6. Other, specify _____

10. During 1982 was any of your work supported or sponsored by U.S. Government funds?

A ☐ Yes B ☐ No C ☐ Don't Know (34)

If YES, which Federal agencies or departments supported the work? Enter number(s) from the List of Federal Supporting Agencies on page 4.

_____ (35-46)

11. How many full-time equivalent years of professional work experience have you had? _____ Year(s) (47-48)

12. Following the receipt of your doctorate, did you leave the work force for any period of at least one year in duration?

A ☐ Yes
B ☐ No (49)

If YES, indicate the beginning and ending years of career disruptions:

_____ to _____ (50-53)
_____ to _____ (54-57)
_____ to _____ (58-61)

13. Have you received any external research support (for at least three months) from any of the following non-government sources in the past two years?

A ☐ Yes B ☐ No If YES, specify below

1. _____ Industry
2. _____ Private Foundations
3. _____ Academe
4. _____ Other, specify _____ (63-66)

14. Please indicate the number of publications you have authored or co-authored in the following categories during the past two years.

	1981-82	
1. Books	_____	(67-68)
2. Chapters in books	_____	(69-70)
3. Monographs and Reports	_____	(71-72)
4. Journal articles	_____	(73-74)
5. Book reviews	_____	(75-76)
6. If NONE, check box ☐		(77)

15. After receiving your doctorate, did you have to acquire formal training in any of the following areas in order to obtain your present position?

A ☐ Yes B ☐ No (10) If YES, specify below

1. _____ Foreign languages
2. _____ Computer science
3. _____ Management and administration
4. _____ Survey research and statistics
5. _____ Other, specify _____ (11-15)

16. Please specify the type and field of any degree(s) you have received after your initial doctorate.

_____ (16-27)

If you devoted a proportion of your professional time which you considered significant to energy or fuel activities during a typical work week, please answer questions #17-20, otherwise skip to item #21.

17. What percent of your professional time did you devote to energy and fuel during a typical week? _____ percent (28-29)

18. From the list below, give the corresponding number of the ONE energy source that involved the LARGEST proportion of your energy-related work during a typical week.

☐ Enter number from below (30)

1. Coal and coal products
2. Petroleum (including oil shale and tar sands) or natural gas
3. Fission
4. Fusion
5. Hydroenergy
6. Direct solar (including space and water heating, thermal, electric)
7. Indirect solar (winds, tides, biomass, etc.)
8. Geothermal
9. Other, specify _____

19. Please read the following list of energy-related activities and give the corresponding number(s) from the list below of the activity(ies) in which you were engaged during a typical week. Enter number(s) from below _____ (31-50)

1. Exploration
2. Extraction (gas, oil, mining)
3. Manufacture of energy-related components or products
4. Fuel processing (including refining and enriching)
5. Electric power generation
6. Transportation, transmission, distribution of fuel or energy
7. Energy storage
8. Energy utilization, management
9. Fuel reprocessing or disposal
10. Energy conservation
11. Environmental impact (health, economic, etc.)
12. Education, training
13. Other, specify _____

20. Please enter the number 1-13 from question #19 that BEST describes the activity in which you spent MOST of your energy-related time. ☐ (51-52)

21. Thank you for completing this questionnaire. Please return the completed form in the enclosed envelope to the National Research Council, JH630, 2101 Constitution Avenue, Washington, D.C. 20418.

EMPLOYMENT SPECIALTIES LIST

MATHEMATICAL SCIENCES

000 - Algebra
010 - Analysis & Functional Analysis
020 - Geometry
030 - Logic (see also 834)
040 - Number Theory
052 - Probability
055 - Math. Statistics (see also 544, 670, 725, 727)
060 - Topology
062 - Operations Research (see also 478)
065 - Applied Mathematics
069 - Combinatorics & Finite Mathematics
098 - Mathematics, General
099 - Mathematics, Other*

COMPUTER AND INFORMATION SCIENCES

071 - Theory
072 - Software Systems
073 - Hardware Systems
074 - Intelligent Systems
079 - Computer Sciences, Other* (see also 437, 476)
081 - Information Sci. & Systems*

PHYSICS & ASTRONOMY

101 - Astronomy
102 - Astrophysics
110 - Atomic & Molecular
120 - Electromagnetism
132 - Acoustics
134 - Fluids
135 - Plasma
136 - Optics
140 - Elementary Particles
150 - Nuclear Structure
157 - Polymer
160 - Solid State
198 - Physics, General
199 - Physics, Other*

CHEMISTRY

200 - Analytical
210 - Inorganic
215 - Synthetic Inorganic & Organometallic
220 - Organic
225 - Synthetic Organic & Natural Products
230 - Nuclear
240 - Physical
250 - Theoretical
255 - Structural
260 - Agricultural & Food
270 - Pharmaceutical
275 - Polymer
290 - Biochemistry (see also 540)
298 - Chemistry, General
299 - Chemistry, Other*

EARTH, ENVIRONMENTAL, AND MARINE SCIENCES

301 - Mineralogy, Petrology
305 - Geochemistry
310 - Stratigraphy, Sedimentation
320 - Paleontology
330 - Structural Geology
341 - Geophysics (Solid Earth)
350 - Geomorph. & Glacial Geology
391 - Applied Geol., Geol. Engr. & Econ. Geol.
398 - Earth Sciences, General
399 - Earth Sciences, Other*
361 - Atmospheric Physics & Chemistry
362 - Atmospheric Dynamics
363 - Atmos. & Meteorol. Sci., Other*
369 - Environmental Sciences, General (see also 480, 526)
389 - Environmental Sciences, Other*
360 - Hydrology & Water Resources
370 - Oceanography
397 - Marine Sciences, Other*

ENGINEERING

400 - Aerospace, Aeronautical & Astronautical
410 - Agricultural
415 - Bioengineering & Biomedical
420 - Civil
430 - Chemical
435 - Ceramic
436 - Communications
437 - Computer
440 - Electrical
445 - Electronics
450 - Industrial & Manufacturing
455 - Nuclear
460 - Engineering Mechanics
465 - Engineering Physics
470 - Mechanical
475 - Metallurgical & Phys. Met. Engr.
476 - Systems Design & Systems Science (see also 072, 073, 074)
478 - Operations Research (see also 062)
479 - Fuel Technology & Petroleum
480 - Sanitary & Environmental Health
485 - Naval Arch. & Marine Engr.
486 - Mining & Mineral
487 - Ocean
490 - Polymer
497 - Materials Science & Engineering
498 - Engineering, General
499 - Engineering, Other*

AGRICULTURAL SCIENCES

901 - Agricultural Economics
906 - Animal Breeding & Genetics
909 - Animal Nutrition
912 - Animal Sciences, Other*
500 - Agronomy
511 - Plant Path. (see also 553)
513 - Plant Breeding & Genetics
514 - Plant Sciences, Other*
903 - Food Science and/or Technology (see also 573)
534 - Forestry
506 - Horticulture
507 - Soil Sciences
515 - Fisheries Sciences
516 - Wildlife Management
518 - Agriculture, General
519 - Agriculture, Other*

MEDICAL SCIENCES

520 - Medicine & Surgery
522 - Public Health & Epidemiology
523 - Veterinary Medicine
524 - Hospital Administration
526 - Nursing
527 - Parasitology
528 - Environmental Health
530 - Audiology & Speech Pathology
534 - Human and Animal Pathology
536 - Pharmacology
537 - Pharmacy
538 - Medical Sciences, General
539 - Medical Sciences, Other*

BIOLOGICAL SCIENCES

540 - Biochemistry (see also 290)
542 - Biophysics
550 - Botany
551 - Bacteriology
552 - Plant Genetics
553 - Plant Path. (see also 511)
557 - Plant Physiology
563 - Human & Animal Genetics
565 - Human & Animal Physiology
569 - Zoology
544 - Biometrics & Biostatistics (see also 055, 670, 725, 727)
546 - Anatomy
546 - Cell Biology
547 - Embryology
548 - Immunology
549 - Endocrinology
560 - Ecology
571 - Entomology
572 - Molecular Biology
573 - Food Science and/or Technology (see also 503)
574 - Behavior/Ethnology
575 - Microbiology
576 - Nutrition & Dietetics
589 - Neurosciences
590 - Toxicology
598 - Biological Sciences, General
599 - Biological Sciences, Other*

PSYCHOLOGY

600 - Clinical
603 - Cognitive
610 - Counseling & Guidance
620 - Developmental & Gerontological
630 - Educational
635 - School
641 - Experimental
642 - Comparative
643 - Physiological
650 - Industrial/Organizational
660 - Personality
670 - Psychometrics (see also 055, 544, 725, 727)
676 - Quantitative
680 - Social
698 - Psychology, General
699 - Psychology, Other*

SOCIAL SCIENCES

700 - Anthropology
703 - Archeology
708 - Communications
709 - Linguistics
710 - Sociology
720 - Economics (see also 501)
725 - Econometrics (see also 055, 544, 670, 727)
727 - Social Statistics (see also 055, 544, 670, 725)
730 - Demography
740 - Geography
745 - Area Studies*
751 - Political Sci. & Government
752 - Public Administration
753 - Public Policy Studies
755 - International Relations
760 - Criminology & Criminal Justice
770 - Urban & Regional Planning
778 - History & Philosophy of Sci.
798 - Social Sciences, General
799 - Social Sciences, Other*

HUMANITIES

804 - History, American
805 - History, European
806 - History, Other*
811 - American Literature
813 - English Language
814 - English Literature
827 - Classics
831 - Speech & Debate
836 - Comperative Literature
839 - Letters, Other*
821 - German
822 - Russian
823 - French
824 - Spanish & Portuguese
826 - Italian
829 - Other Languages*
802 - Art History & Criticism
808 - American Studies
809 - Theatre & Theatre Criticism
830 - Music
833 - Religious Studies (see also 681)
834 - Philosophy (see also 030)
891 - Library & Archival Sciences
878 - Humanities, General
879 - Humanities, Other*

EDUCATION AND PROFESSIONAL FIELDS

801 - Applied Art
811 - Theology (see also 833)
882 - Business & Management
883 - Home Economics
884 - Journalism
886 - Law, Jurisprudence
887 - Social Work
888 - Architec. & Environ. Design
895 - Professional Fields, General
897 - Professional Fields, Other*
838 - Education (other than teaching in a field listed above)

999 - OTHER FIELDS*

*Identify the specific field in the space on the questionnaire.

LIST OF FEDERAL SUPPORTING AGENCIES (For use with # 10)

1. Agency for International Development
2. Environmental Protection Agency
3. National Aeronautics & Space Administration
4. National Endowment for the Arts
5. National Endowment for the Humanities
6. National Science Foundation
7. Nuclear Regulatory Commission
8. Smithsonian Institution
9. Department of Agriculture
10. Department of Commerce
11. Department of Defense
12. Department of Energy
13. National Institutes of Health (DHHS)
14. Alcohol, Drug Abuse & Mental Health Administration (NIAA, NIDA, NIMH)
15. Other DHHS, specify _____
16. Department of Education (NIE, OE, NCES)
17. Department of Housing and Urban Development
18. Department of the Interior
19. Department of Justice
20. Department of Labor
21. Department of State
22. Department of Transportation
23. Other agency or department, specify _____
24. Don't know source agency

1983 SURVEY OF DOCTORATE RECIPIENTS

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION, THE NATIONAL ENDOWMENT FOR THE HUMANITIES, THE NATIONAL INSTITUTES OF HEALTH, AND THE DEPARTMENT OF ENERGY

If your name or address is incorrect, please enter correct information below.

_____

_____

_____ (10-11)

Listed below are responses that you provided to us in previous NRC doctoral surveys. Please check this information to determine if it accurately reports your status as of FEBRUARY 1983. If the data are correct, simply check the "no change" box. If the data are missing or no longer correct, please enter the correct information in the spaces provided.

	Previous Survey Response	No Change	Changes as of February 1983
1. Date of Birth			_____ (12-16)
2. Institution/Year of Doctorate			_____ (17-24)
3. Citizenship		☐	_____ (25)
4. Marital Status		☐	_____ (26)
5. Academic Rank		☐	_____ (27)
6. Tenure Status		☐	_____ (28-31)
7. Employment Status		☐	_____ (35-37) Enter from Coding Sheet

8. **What is your racial background?**

1 ☐ American Indian or Alaskan Native
2 ☐ Asian or Pacific Islander
3 ☐ Black
4 ☐ White (32)

Is your ethnic heritage Hispanic?

A ☐ Yes
B ☐ No (33)

If YES, is it:
1 ☐ Mexican-American
2 ☐ Puerto Rican
3 ☐ Other Hispanic (34)

9. **If you were employed part-time during FEBRUARY 1983, what was the MOST important reason for being in part-time status?**

☐ Enter number from below (38)

1. Part-time employment preferred
2. Full-time position not available
3. Constraints due to family or marital status
4. Other, specify _____

10. **Please give the name of your principal employer (company, organization, postdoctoral institution, etc. or, if self employed, write "self") and actual place of employment during FEBRUARY 1983.**

_____
Name of Employer (39-46)

_____
City State ZIP (47-56)

11. **From the enclosed Employment Specialties List, enter both the number and title of the employment specialty most closely related to your principal employment or postdoctoral appointment during February 1983. Write in your specialty if it is not on the list.**

_____
Number Title of Employment Specialty (56-58)

	Previous Survey Response	No Change	Changes as of February 1983
12. Type of Employer		☐	_____ (59-60) Enter from Coding Sheet
13. Primary Work Activity		☐	_____ (24-25) Enter from Coding Sheet

(over, please)

14. What was the basic annual salary* associated with your principal professional employment during FEBRUARY 1983? If you were on a postdoctoral appointment, what was your stipend plus allowances? $_____ per year (28-30)

Check whether salary was for ☐ 9-10 months or ☐ 11-12 months (31)

*Basic salary is your annual salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, or other payment for professional work.

15. If you were employed during FEBRUARY 1983 in a specialty field other than your field of Ph.D., what was the MOST important reason for being in that position?

☐ Enter number from below (32)

1. Better pay
2. More attractive career options
3. Preferred specific geographic location
4. Constraints due to family or marital status
5. Position in Ph.D. field not available
6. Promoted into new field
7. Other, specify _____

16. If you were employed in a non-academic job in FEBRUARY 1983, what was the MOST important reason for your decision to enter this job?

☐ Enter number from below (33)

1. Better pay
2. More attractive career options
3. Preferred specific geographic location
4. Constraints due to family or marital status
5. Academic position not available
6. Other, specify _____

17. During 1982 was any of your work supported or sponsored by U.S. Government funds?

A ☐ Yes B ☐ No C ☐ Don't Know (34)

If YES, which Federal agencies or departments supported the work?

_____ (35-46)

18. How many full-time equivalent years of professional work experience have you had? _____ Year(s) (47-48)

19. Following the receipt of your doctorate, did you leave the work force for any period of at least one year in duration?

A ☐ Yes
B ☐ No (49)

If YES, indicate the beginning and ending years of career disruptions:

_____ to _____ (50-53)

_____ to _____ (54-57)

_____ to _____ (58-61)

20. Have you received any external research support (for at least three months) from any of the following non-government sources in the past two years?

A ☐ Yes B ☐ No

If YES, specify below (62)

1. _____ Industry
2. _____ Private Foundations
3. _____ Academe
4. _____ Other, specify _____ (63-66)

21. Please indicate the number of publications you have authored or co-authored in the following categories during the past two years.

	1981-82	
1. Books	_____	(67-68)
2. Chapters in books	_____	(69-70)
3. Monographs and Reports	_____	(71-72)
4. Journal articles	_____	(73-74)
5. Book reviews	_____	(75-76)

6. If NONE, check box ☐ (77)

22. After receiving your doctorate, did you have to acquire formal training in any of the following areas in order to obtain your present position?

A ☐ Yes B ☐ No (10)

If YES, specify below

1. _____ Foreign languages
2. _____ Computer science
3. _____ Management and administration
4. _____ Survey research and statistics
5. _____ Other, specify _____ (11-15)

Thank you for completing this questionnaire. Please return the completed form in the enclosed envelope to the National Research Council, JH630, 2101 Constitution Avenue, Washington, D.C. 20418.

NOTE: THIS INFORMATION IS SOLICITED UNDER THE AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION ACT OF 1950, AS AMENDED. ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL, WILL BE SAFEGUARDED IN ACCORDANCE WITH THE PROVISIONS OF THE PRIVACY ACT OF 1974, AND WILL BE USED FOR STATISTICAL PURPOSES ONLY. INFORMATION WILL BE RELEASED ONLY IN THE FORM OF STATISTICAL SUMMARIES OR IN A FORM WHICH DOES NOT IDENTIFY INFORMATION ABOUT ANY PARTICULAR PERSON. YOUR RESPONSE IS ENTIRELY VOLUNTARY AND YOUR FAILURE TO PROVIDE SOME OR ALL OF THE REQUESTED INFORMATION WILL IN NO WAY ADVERSELY AFFECT YOU.

CODING SHEET

Employment Status (For use with Question # 7)

1. Employed full-time (35 hours or more/week in one position)
2A. Employed part-time, seeking full-time employment
2B. Employed part-time, not seeking full-time employment
3A. Postdoctoral appointment,* full-time
3B. Postdoctoral appointment,* part-time
4. Unemployed and seeking employment
5. Not employed and not seeking employment
6. Retired and not employed
7. Other, specify

*Temporary appointment in academia, industry, or government, the primary purpose of which is to provide for continued education or experience in research.

Type of Employer (For use with Question # 12)

1. Business or industry (including self-employed)
2. Junior college, 2-year college, technical institute
3. Medical school (including university affiliated hospital or medical center)
4. 4-year college
5. University, other than medical school
6. Elementary or secondary school system
7. Private foundation
8. Hospital or clinic
9. U.S. Military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA
10. U.S. government, civilian employee
11. State government
12. Local or other government, specify
13. Nonprofit organization, other than those listed above
14. Other, specify

Primary Work Activity (For use with Question # 13)

1. Teaching
2. Basic research
3. Applied research
4. Development of equipment, products, systems, data
5. Design
6. Writing, editing
7. Professional services to individuals
8. Management of R&D
9. Management of educational/other programs
10. Consulting
11. Operations - production, maintenance, construction, installation
12. Quality control, testing, evaluation
13. Sales, marketing, purchasing, estimating
14. Archival work
15. Curatorial work
16. Performing arts
17. Other, specify

CODING SHEET *(Continued)*

EMPLOYMENT SPECIALTIES LIST (For use with Question # 11)

MATHEMATICAL SCIENCES

000 - Algebra
010 - Analysis & Functional Analysis
020 - Geometry
030 - Logic (see also 834)
040 - Number Theory
052 - Probability
055 - Math. Statistics (see also 544, 670, 725, 727)
060 - Topology
082 - Operations Research (see also 478)
085 - Applied Mathematics
089 - Combinatorics & Finite Mathematics
098 - Mathematics, General
099 - Mathematics, Other*

COMPUTER AND INFORMATION SCIENCES

071 - Theory
072 - Software Systems
073 - Hardware Systems
074 - Intelligent Systems
078 - Computer Sciences, Other* (see also 437, 476)
081 - Information Sci. & Systems*

PHYSICS & ASTRONOMY

101 - Astronomy
102 - Astrophysics
110 - Atomic & Molecular
120 - Electromagnetism
132 - Acoustics
134 - Fluids
136 - Plasma
138 - Optics
140 - Elementary Particles
150 - Nuclear Structure
157 - Polymer
160 - Solid State
198 - Physics, General
199 - Physics, Other*

CHEMISTRY

200 - Analytical
210 - Inorganic
215 - Synthetic Inorganic & Organometallic
220 - Organic
225 - Synthetic Organic & Natural Products
230 - Nuclear
240 - Physical
250 - Theoretical
255 - Structural
260 - Agricultural & Food
270 - Pharmaceutical
275 - Polymer
280 - Biochemistry (see also 540)
290 - Chemistry, General
299 - Chemistry, Other*

EARTH, ENVIRONMENTAL, AND MARINE SCIENCES

301 - Mineralogy, Petrology
305 - Geochemistry
310 - Stratigraphy, Sedimentation
320 - Paleontology
330 - Structural Geology
341 - Geophysics (Solid Earth)
350 - Geomorph. & Glacial Geology
351 - Applied Geol., Geol. Engr. & Econ. Geol.
360 - Earth Sciences, General
369 - Earth Sciences, Other*
381 - Atmospheric Physics & Chemistry
382 - Atmospheric Dynamics
383 - Atmos. & Meteorol. Sci., Other*
388 - Environmental Sciences, General (see also 480, 528)
389 - Environmental Sciences, Other*
390 - Hydrology & Water Resources
370 - Oceanography
397 - Marine Sciences, Other*

ENGINEERING

400 - Aerospace, Aeronautical & Astronautical
410 - Agricultural
415 - Bioengineering & Biomedical
420 - Civil
430 - Chemical
435 - Ceramic
436 - Communications
437 - Computer
440 - Electrical
445 - Electronics
450 - Industrial & Manufacturing
455 - Nuclear
460 - Engineering Mechanics
465 - Engineering Physics
470 - Mechanical
475 - Metallurgical & Phys. Met. Engr.
476 - Systems Design & Systems Science (see also 072, 073, 074)
478 - Operations Research (see also 082)
479 - Fuel Technology & Petroleum
480 - Sanitary & Environmental Health
485 - Naval Arch. & Marine Engr.
486 - Mining & Mineral
487 - Ocean
490 - Polymer
497 - Materials Science & Engineering
498 - Engineering, General
499 - Engineering, Other*

AGRICULTURAL SCIENCES

501 - Agricultural Economics
508 - Animal Breeding & Genetics
509 - Animal Nutrition
512 - Animal Sciences, Other*
500 - Agronomy
511 - Plant Path. (see also 553)
513 - Plant Breeding & Genetics
514 - Plant Sciences, Other*
503 - Food Science and/or Technology (see also 573)
505 - Forestry
506 - Horticulture
507 - Soil Sciences
515 - Fisheries Sciences
516 - Wildlife Management
518 - Agriculture, General
519 - Agriculture, Other*

MEDICAL SCIENCES

520 - Medicine & Surgery
522 - Public Health & Epidemiology
523 - Veterinary Medicine
524 - Hospital Administration
526 - Nursing
527 - Parasitology
528 - Environmental Health
530 - Audiology & Speech Pathology
534 - Human and Animal Pathology
536 - Pharmacology
537 - Pharmacy
538 - Medical Sciences, General
539 - Medical Sciences, Other*

BIOLOGICAL SCIENCES

540 - Biochemistry (see also 280)
542 - Biophysics
550 - Botany
551 - Bacteriology
552 - Plant Genetics
553 - Plant Path. (see also 511)
557 - Plant Physiology
563 - Human & Animal Genetics
566 - Human & Animal Physiology
569 - Zoology
544 - Biometrics & Biostatistics (see also 055, 670, 725, 727)
545 - Anatomy
546 - Cell Biology
547 - Embryology
548 - Immunology
549 - Endocrinology
560 - Ecology
571 - Entomology
572 - Molecular Biology
573 - Food Science and/or Technology (see also 503)
574 - Behavior/Ethnology
575 - Microbiology
576 - Nutrition & Dietetics
589 - Neurosciences
590 - Toxicology
598 - Biological Sciences, General
599 - Biological Sciences, Other*

PSYCHOLOGY

600 - Clinical
603 - Cognitive
610 - Counseling & Guidance
620 - Developmental & Gerontological
630 - Educational
635 - School
641 - Experimental
642 - Comparative
643 - Physiological
650 - Industrial/Organizational
660 - Personality
670 - Psychometrics (see also 055, 544, 725, 727)
675 - Quantitative
680 - Social
698 - Psychology, General
699 - Psychology, Other*

SOCIAL SCIENCES

700 - Anthropology
703 - Archaeology
708 - Communications
709 - Linguistics
710 - Sociology
720 - Economics (see also 501)
725 - Econometrics (see also 055, 544, 670, 727)
727 - Social Statistics (see also 055, 544, 670, 725)
730 - Demography
740 - Geography
745 - Area Studies*
751 - Political Sci. & Government
752 - Public Administration
753 - Public Policy Studies
755 - International Relations
760 - Criminology & Criminal Justice
770 - Urban & Regional Planning
775 - History & Philosophy of Sci.
798 - Social Sciences, General
799 - Social Sciences, Other*

HUMANITIES

804 - History, American
805 - History, European
806 - History, Other*

811 - American Literature
813 - English Language
814 - English Literature
827 - Classics
831 - Speech & Debate
838 - Comparative Literature
839 - Letters, Other*

821 - German
822 - Russian
823 - French
824 - Spanish & Portuguese
826 - Italian
829 - Other Languages*

802 - Art History & Criticism
808 - American Studies
809 - Theatre & Theatre Criticism
830 - Music
833 - Religious Studies (see also 881)
834 - Philosophy (see also 030)
891 - Library & Archival Sciences
878 - Humanities, General
879 - Humanities, Other*

EDUCATION AND PROFESSIONAL FIELDS

801 - Applied Art
881 - Theology (see also 833)
882 - Business & Management
883 - Home Economics
884 - Journalism
886 - Law, Jurisprudence
887 - Social Work
888 - Architec. & Environ. Design
896 - Professional Fields, General
897 - Professional Fields, Other*
936 - Education (other than teaching in a field listed above)

999 - OTHER FIELDS*

*Identify the specific field in the space on the questionnaire.

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If your name and address are incorrect, please correct the label to your left.

A. What was your employment status during February, 1983?

1. ☐ Employed full-time
2. ☐ Employed part-time
   Were you seeking full-time employment?
   ☐ Yes ☐ No
3. ☐ Postdoctoral appointment
   ☐ Full-time ☐ Part-time
4. ☐ Unemployed and seeking employment
5. ☐ Not employed and not seeking employment
6. ☐ Retired and not employed
7. ☐ Other, specify: _____

B. What was your primary work activity?

1. ☐ Teaching
2. ☐ Basic research
3. ☐ Applied research
4. ☐ Development
5. ☐ Writing/editing
6. ☐ Professional services to individuals
7. ☐ Management of R & D
8. ☐ Management of educ/other programs
9. ☐ Consulting
10. ☐ Other, specify: _____

C. What was the title of the employment specialty most closely related to your principal employment/postdoctoral appointment? _____

D. Which category best describes your principal employment during February, 1983?

1. ☐ Business/industry (includes self-employed)
2. ☐ Two-year college
3. ☐ Medical school
4. ☐ Four-year college
5. ☐ University
6. ☐ Elementary or secondary school system
7. ☐ Private foundation
8. ☐ Hospital or clinic
9. ☐ U.S. military service
10. ☐ U.S. government, civilian employee
11. ☐ State government
12. ☐ Local or other government
13. ☐ Non-profit organization
14. ☐ Other, specify: _____

E. If academically employed during February 1983, what was your rank and tenure status?

F. What is your date of birth? _____
Marital status? _____
Citizenship? _____

119

NATIONAL RESEARCH COUNCIL
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RETURN POSTAGE GUARANTEED
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The National Research Council has recently obtained data from a large stratified sample of doctorates. Although the overall response rate of the 1983 Survey has been good, we have not had a high response from individuals in your doctoral field.

Prior to publication of summarized data, we are conducting this special follow-up to nonrespondents in <u>your doctoral field</u> as a means of measuring the accuracy of the data we have collected.

Won't you please take a few minutes and complete the attached postcard? All forms returned prior to November 30th will be included in our summary report.

Thank you for your cooperation.

R. D. Hanfield
Project Director

APPENDIX C

SAMPLING FRAME

Sampling Frame

Data from the Survey of Doctorate Recipients (SDR) are collected biennially from a stratified random sample of Ph.D. scientists, engineers, and humanists. A longitudinal data base has been constructed from the six surveys conducted since 1973. For each survey, adjustments have been made to both the sampling frame (population) and the sample. These revisions have significant implications when comparing the results of one survey to the results of another.

1973

In 1973 a sample of approximately 56,100 individuals was randomly selected from a population of 261,400 who earned either doctorates in science or engineering between January 1, 1930, and June 30, 1972, or nonscience/nonengineering Ph.D.s employed in a science or engineering position in the same period. The overall sampling rate, therefore, was 21.5 percent (see 1981 Profile, page 88, Table D.5). The sample was stratified by year of doctorate, field of doctorate or employment, sex, size of Ph.D. institution (in terms of the number of Ph.D. degrees granted), and degree category (i.e., segment 1, science and engineering Ph.D.s from U.S. institutions; segment 2, nonscience Ph.D.s (from U.S. institutions) who subsequently switched to a science employment field; and segment 3, holders of doctorates from foreign institutions who were employed in the United States).

The sampling frame for segment 1 was the NRC's Doctorate Records File (DRF), which contains information about nearly all Ph.D.s awarded from U.S. universities between 1920 and the present as obtained from the annual Survey of Earned Doctorates (SED). Segment 2 cases were drawn from the NSF's National Register of Scientific and Technical Personnel (1970). Segment 3 cases were selected from college catalogs, professional directories, and rosters of employees obtained from several large U.S. business/industrial firms.

1975

Individuals who earned their Ph.D. degrees in science/engineering between July 1, 1972, and June 30, 1974, were added to segment 1 of the

SDR roster prior to the 1975 survey. A random, stratified sample of these Ph.D.s was added to the 1975 survey sample, and 1930-1931 Ph.D.s were deleted from the sample, leaving a sample of approximately 62,470 Ph.D.s. This number represented an overall sampling rate of 21.1 percent (see 1981 Profile, page 87, Table D.4).

A revision in the stratification criteria resulted in the deletion of size of Ph.D. institution as a stratifying variable and the addition of racial/ethnic classification. The source of data for the racial/ethnic variable was the SED. However, because data on racial/ethnic identification was not collected by the DRF until 1973, a large portion of the sample could not be classified.

1977

The cohort adjustments were again made to maintain a 42-year time span (January 1, 1934, to June 30, 1976) for scientists and engineers.

Individuals who indicated in the SED that they were foreign citizens and planned to depart the United States following receipt of their doctorates were deleted from the 1977 sampling frame based on the high probability that they would remain outside the U.S. labor force.

Humanities Ph.D. recipients were newly added to the survey in 1977. Because humanities doctorates were not sampled in the 1973 and 1975 surveys, when data for the 1930-1933 graduates in science and engineering were collected, the cohort span was extended for humanities Ph.D.s to 46 years and included those earning their degrees between January 1, 1930, and June 30, 1976. A stratified random sample of these doctorates was added to segment 1 of the sampling frame.

With the addition of the humanities Ph.D.s to the survey sample and their inclusion in segment 1 of the sampling frame, individuals with degrees in humanities fields were deleted from segment 2, making that group consist of doctorate recipients in education and other professional fields only. The 1977 survey sample was approximately 83,550 (see 1981 Profile, page 86, Table D.3).

1979

The 1979 sampling frame was adjusted to include only Ph.D. recipients who had earned their degrees between January 1, 1936, and June 30, 1978.

In the nonresponse bias study of the 1975 SDR, it was discovered that the survey nonrespondents consisted of higher percentages of foreign citizens and foreign residents. To adjust for this bias, citizenship was added as a stratification variable. The 1979 sample consisted of approximately 51,710 Ph.D.s (see 1981 Profile, page 85, Table D.2), an overall sampling rate of 11.8 percent.

1981

For the 1981 Survey, the cohort adjustments were again made to main-

tain a 42-year time span (January 1, 1938, to June 30, 1980). In addition, the overall sampling rate for FY1973-1976 Ph.D.s was increased from 11.8 percent to 15 percent in 1981 because of special interest in studying, in detail, the employment characteristics of recent doctorate recipients.

On a one-time basis, the 1981 sampling frame included individuals who earned their doctoral degrees between July 1980 and February 1981. This 8-month extension was done in response to a study that required data on the most recent Ph.D. recipients. The 1981 sample was approximately 65,390 Ph.D.s (see 1981 Profile, page 84, Table D.1), an overall sampling rate of 13.5 percent.

1983

For the current survey, a sample of 69,865 Ph.D.s was drawn from a sampling frame of 515,259 doctorate recipients, yielding an overall sampling rate of 13.6 percent (see Appendix D). In keeping with previous surveys, the cohort population was adjusted to maintain a 42-year time span and included only those Ph.D. recipients who earned their degrees between January 1, 1940, and June 30, 1982. Religious studies and audiology/speech pathology doctorate recipients were added to the 1983 sampling frame, and a stratified random sample of these cases was added to the survey sample.

Sampling Rates

For the 1973, 1975, and 1977 surveys, the sampling rate averaged 21 percent. In 1979, the longitudinal sample was reduced in size because of budgetary constraints. The revised sample, using a rate of 11.8 percent, was reviewed to assure that it was large enough to provide reliable estimates of the Ph.D. population. In 1981 the sample of FY1973-1976 Ph.D.s was increased, yielding a rate of 13.5 percent. For the 1983 survey, the sample was selected at a 13.6 percent rate.

A total of 106,688 Ph.D. recipients have been selected for at least one of the six SDR samples. Of these, 28,540, or 26.8 percent, have been included in all six samples, 10,888 have responded to all six surveys; and 84,316 have responded to at least one of the surveys.

Effect on Sampling Errors

Obviously, any change in the sample size has an effect on the sampling errors of population estimates. If the proportion of the population possessing a particular characteristic, P, is being estimated by the statistic p, the standard error of p can be computed by

$$S.E.(p) = [VAR(P)/n]^{1/2},$$

where $VAR(P)$ is estimated by $[p(1-p)]$ and p equals the sample proportion and n equals the sample size.

This formula is equivalent to

$$S.E.(p) = [S.D.(\underline{P})]/(n)^{\frac{1}{2}}$$

where S.D.($\underline{P}$) is the standard deviation of $\underline{P}$. Holding S.D.($\underline{P}$) fixed, the sampling error, S.E.(p), will vary as n is adjusted by a factor k:

$$S.E.(p) = [S.D.(\underline{P})]/(kn)^{\frac{1}{2}} \text{ or}$$

$$S.E.(p) = [S.D.(\underline{P})]/(k)^{\frac{1}{2}} \cdot (n)^{\frac{1}{2}}.$$

If the sample size is increased to $\hat{n}$,

$$k = (\hat{n}/n) > 1.$$

In this case the sampling error is reduced by a factor of $1/(k)^{\frac{1}{2}}$. For example, if the sample p equals 0.2, the estimated

$$S.D.\ (\underline{P}) = [0.2(1-0.2)]^{\frac{1}{2}} = 0.4.$$

If n is 100,

$$S.E.(p) = [0.4/(100)^{\frac{1}{2}}] = 0.04.$$

If n is increased to 1600,

$$S.E.(p) = [0.4/(1600)^{\frac{1}{2}}] = 0.01.$$

Here k = 16 and the sampling error is $1/(k)^{\frac{1}{2}}$ of its original value.

If the sample size is decreased to $\hat{n}$,

$$k = (\hat{n}/n) < 1.$$

In this case, the sampling error is increased by a factor of $1/(k)^{\frac{1}{2}}$. In the previous example, if the initial sample size equalled 1600,

$$k = (100/1600) = 1/16.$$

The sampling error increased from 0.01 to 0.04, a factor of 4.

For the 1983 SDR, the sampling frame is 515,259, and the sample is 69,865. If the earlier 21 percent sampling rate had been applied, the 1983 sample would have been 108,204. The expected effect of the sample size reduction on the sampling errors surrounding the estimates of the total population can be approximated by computing

$$k = (69,865/108,204) = .646 \text{ and } 1/(k)^{\frac{1}{2}} = 1.24.$$

Thus, for a fixed standard deviation, the sampling error should be approximately 24 percent greater under the 1983 sampling scheme.

In these computations, the effects of the finite population correction factor (fpc) have been ignored. The fpc has little effect on sampling error estimates for large populations and low sampling rates. However, although the overall sampling rate for the 1983 SDR sample is 13.6 percent, sampling rates for the strata range from roughly 2 percent to 100 percent. Thus, computation of sampling errors that takes into account sample stratification will result in lower sampling error estimates than computations that disregard the sample design.

Finally, this discussion applies only to the total sample n and does not address the issue of less than complete survey response, which will of course effectively reduce the sample and thus increase the sampling error. The effects of nonresponse bias are discussed in Appendix G.

APPENDIX D

RESPONSE RATES

TABLE D-1 Response Rates for the 1983 Survey of Doctorate Recipients in Science, Engineering, and the Humanities

	Sampling Frame (N)	Sample (n)	Survey Sample (n)	Contacted (n)	Survey Responses (N)	Response Rates A (%)	Response Rates B (%)
Total	515,259	69,865	67,460	60,156	44,277	65.6	73.6
Field of Doctorate/Employment							
Mathematics/Computer Sciences	23,131	4,778	4,672	4,140	3,045	65.2	73.6
Physics/Astronomy	33,592	3,932	3,839	3,443	2,503	65.2	72.7
Chemistry	54,476	6,001	5,882	5,168	3,872	65.8	74.9
Environmental Sciences	13,388	2,994	2,911	2,597	2,040	70.1	78.6
Engineering	60,661	4,097	4,018	3,504	2,453	61.1	70.0
Life Sciences	108,437	19,484	18,910	16,972	12,817	67.8	75.5
Psychology	53,906	6,432	6,228	5,514	4,100	65.8	74.4
Social Sciences	67,109	5,769	5,512	4,948	3,552	64.4	71.8
Natural Sciences	1,478	243	131	125	107	81.7	85.6
Physical Sciences	499	485	483	408	219	45.3	53.7
Behavioral Sciences	3,760	215	144	131	101	70.1	77.1
All Science/Engineering Fields	2,506	345	250	225	168	67.2	74.7
History	21,752	1,825	1,760	1,605	1,189	67.6	74.1
Art History	2,419	911	872	809	600	68.8	74.2
Music	5,798	962	921	851	661	71.8	77.7
Speech	4,952	919	817	752	523	64.0	69.5
Philosophy	6,875	1,428	1,385	1,224	854	61.7	69.8
English/American Literature	24,463	2,285	2,209	1,993	1,410	63.8	70.7
Classical Language/Literature	2,067	762	727	659	496	68.2	75.3
Modern Language/Literature	13,786	2,894	2,804	2,523	1,784	63.6	70.7
Religious Studies	1,439	409	409	299	216	52.8	72.2
Other Humanities	4,214	1,149	1,106	991	765	69.2	77.2
Languages	686	285	280	241	154	55.0	63.9
Other Humanities	1,533	792	764	677	432	56.5	63.8
All Humanities Fields	1,806	358	351	301	182	51.9	60.5
Field Unknown	526	111	75	56	34	45.3	60.7
Year of Doctorate							
CY1938-CY1957	82,540	11,025	9,623	8,866	6,745	70.1	75.9
CY1958-FY1969	143,922	15,814	15,104	13,952	10,337	68.4	74.1
FY1970-FY1976	160,154	25,443	25,215	22,261	15,897	63.0	71.4
FY1977-FY1980	84,934	11,178	11,152	9,737	7,175	64.3	73.7
FY1981-FY1982	42,312	5,781	5,780	4,931	3,867	66.9	78.4
Merged Cohorts	722	420	398	278	193	48.5	69.4
Cohort Unknown	675	204	188	111	63	33.5	56.8

Sex							
Male	433,160	43,894	42,307	37,802	27,636	65.3	73.1
Female	82,099	25,971	25,153	22,354	16,641	66.2	74.4
Race/Ethnic Group							
White/Unknown	488,291	60,325	57,985	52,115	39,187	67.6	75.2
Minority Group	26,968	9,540	9,475	8,041	5,090	53.7	63.3
Citizenship							
U.S.	373,786	49,196	48,328	43,666	33,403	69.1	76.5
Foreign	51,146	8,292	8,228	6,737	3,536	43.0	52.5
Unknown	90,327	12,377	10,904	9,753	7,338	67.3	75.2
Location of Ph.D. Institution							
U.S.	503,671	68,111	65,799	58,969	43,470	66.1	73.7
Foreign	11,588	1,754	1,661	1,187	807	48.6	68.0

The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science and engineering. Hence, these numbers exceed the population estimates shown in the other tables of this report.
The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1983 survey.
The out-of-scope classification is assigned to an individual who indicated in a previous survey that he or she:
a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position or
b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.
The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.
Responses include individuals found to be deceased in the 1983 survey and persons residing in foreign countries in 1983.
Response rate "A" is the number of 1983 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1983 survey responses divided by the number assumed to have been contacted.
Individuals who earned doctorates in science, engineering, or the humanities were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.
Merged fields created for certain small subgroups when sample was reduced.
Merged cohorts created for certain small subgroups when sample was reduced.
Includes only those individuals whose racial/ethnic group was known at the time the sample was selected.

APPENDIX E

SAMPLING ERROR

Sampling Error Estimates for Ratios

Most of the statistics presented in this report are ratios of two weighted sums of observation, i.e., ratios of random variables. Thus, for example, we are concerned with a ratio, r - y/x, where

$$y = \sum_{h=1}^{n} \left[N_h/n_h\right] \sum_{i=1}^{n} y_{hi}$$

$$x = \sum_{h=1}^{n} \left[N_h/n_h\right] \sum_{i=1}^{n} x_{hi}$$

and where y_{hi} and x_{hi} are observations made on the i^{th} response of stratum h, N_h is the number of individuals in the active population of stratum h, and n_h is the number of responses for stratum h.

The estimates of sampling error for most statistics in this report are computed based on a stratified random sampling scheme (whereby the responses obtained for each stratum are a random sample from that stratum). Strata were combined whenever the number of responses in a stratum was less than two.

The variance of the ratio y/x is estimated by the expression

$$s_r^2 = \left(\frac{y}{x}\right)^2 \left(\frac{s_y^2}{y^2} + \frac{s_x^2}{x^2} - \frac{2s_{xy}}{xy}\right)$$

where

$$s_{xy} = \sum_{h=1}^{n} \frac{N_h^2}{n_h} \frac{N_h - n_h}{N_h - 1} \frac{1}{n_h - 1} \left(\sum_{i=1} \left[x_{hi} - \bar{x}_h\right] \left[y_{hi} - \bar{y}_h\right]\right),$$

TABLE E-1 Comparison of Sampling Errors for Selected Statistics

	Sample Size of Variable Base
SCIENCE/ENGINEERING	
Field of Ph.D.--Total	33,332
Physics/Astronomy Ph.D.--Total Employed	1,491
Biological Science Ph.D.--Total	7,850
Labor Force--Total	30,921
Labor Force--Total Social Science Ph.D.	3,083
Labor Force--Total Male	20,460
Labor Force--Medical Science Ph.D./Female	958
Computer Science Ph.D.--Total Full- or Part-time Employed	521
Chemistry Ph.D. (FY1977-1982 Graduates)--Total Full- or Part-time Employed	662
1960-1969 Ph.D. Recipients (Male)--Total Academically Employed	3,017
HUMANITIES	
Field of Ph.D.--Total	8,675
History Ph.D.--Total Employed	1,083
Philosophy Ph.D.--Total	875
Labor Force--Total	7,899
Labor Force--Total Music Ph.D.	676
Labor Force--Classical Languages and Literature Ph.D., Male	250
Art History Ph.D.--Total Full-or Part-time Employed	506
Speech/Theater Ph.D. (FY1977-1982 Graduates)--Total Full- or Part-time Employed	124
1960-1969 Ph.D. Recipients (Male)--Total Academically Employed	700

*Subcategory statistics are percentages of the variable base.
**Sp percentages = srs.
***Sr percentages are stratified.

Variable Base Subcategory	Subcategory Statistics*	Sp (%)**	Sr (%)***	Statistic Reference
Engineering	14.9	0.2	0.1	Table 2-1
Employed in Physics/Astronomy	57.9	1.3	1.2	Table 2-2
Female	20.0	0.4	0.2	Table 2-3
Unemployed, Seeking Employment	1.0	0.1	0.1	Table 2-5
Employed Full-time	91.9	0.5	0.6	Table 2-5
Unemployed, Seeking Employment	0.8	0.1	0.1	Table 2-5
Employed Full-time	81.4	1.3	1.4	Table 2-5
Employed in Business or Industry	47.7	2.2	3.4	Table 2-7
Employed in Teaching	8.0	1.1	1.3	Table 2-10
Hold Rank of Professor	70.5	0.8	1.0	Table 2-14
History Ph.D.	23.9	0.4	0.2	Table 3-1
Employed in Other Humanities	2.9	0.5	0.6	Table 3-2
Female	14.6	1.2	0.3	Table 3-3
Unemployed, Seeking Employment	1.7	0.1	0.2	Table 3-5
Employed Full-time	89.6	1.2	1.2	Table 3-5
Employed Full-time	93.1	1.6	1.6	Table 3-5
Employed in 4-year College/University	76.4	1.9	1.8	Table 3-7
Employed in Management/Administration	8.1	2.4	2.6	Table 3-10
Hold Rank of Professor	69.0	1.7	2.3	Table 3-14

$\bar{x}_h$ and $\bar{y}_h$ being the means of the x and y values observed in stratum h, respectively. Similarly, s_x^2 and s_y^2 are defined using

$$\sum_{i=1}^{n} \left[x_{hi} - \bar{x}_h\right]^2 \quad \text{and} \quad \sum_{i=1}^{n} \left[y_{hi} - \bar{y}_h\right]^2$$

(These are combined in parentheses in s_{xy} formula above.)

Comparisons can be made between sampling errors computed on the basis of a simple random sample (srs) and those that take into account stratification. Table E-1 presents sampling errors associated with selected statistics from the report. Bases of various sample sizes and a range of statistic values have been chosen to provide representative comparisons. Sampling errors in the column s_p were computed with the expression $[p(1-p)/n]^{1/2}$ where "n" refers to the number of respondents, while those under s_r were calculated with the formula described above, which takes into account the sample design. The statistics are in percentage form and are the estimated proportion of a variable category with a given characteristic

$$\frac{1}{n}\sum_{i=1}^{n} y_i$$

(for the purposes of s_p), or the ratio of two random variables, y/x (for the purposes of s_r). Whenever possible, the subgroups examined are the same as those in the 1977 Profile in order to facilitate comparisons of the effects on sampling errors of sample size reductions.

For the most part, differences between the two error estimates are small. Calculations based on srs are, for many statistics, the same as or slightly higher than those that take into account the stratification. For statistics that are ratios of two stratifying variables (e.g., the ratio of women philosophy Ph.D.s to total philosophy Ph.D.s), the estimate of sampling error is much higher using the formula for s_p. In certain cases (mainly those involving estimates of type of employer or primary work activity for small subgroups), the use of the formula for s_p appears to underestimate the sampling error.

Taking these potential discrepancies into account, a useful approximation of the sampling errors of those statistics presented in this report in percentage form can be obtained from Table E-2. This table summarizes sampling errors associated with various proportion values at given sample sizes. Calculations in this table assume a simple random sample.

Values for Table E-2 were computed using the formula

$$s_p = [p(1-p)/n]^{1/2},$$

in which p is the proportion of a particular category (variable) possessing a certain characteristic

$$y \left(\text{i.e., } p = \frac{1}{n} \sum_{i}^{n} y_i \right)$$

and n is the number of sample cases in the variable-specified category (e.g., doctoral scientists and engineers in the U.S. labor force). The finite population correction factor

$$\text{fpc} = \left([N-n] \ / \ [N-1] \right)^{\frac{1}{2}}$$

has been omitted from the calculations, since the fpc has a negligible effect on most statistics in this report unless the estimate applies to a subgroup that has a high sampling rate. In any case, the omission of the fpc in the formula for s_p yields a conservative estimate (i.e., a higher estimate) of the sampling error.

The estimated populations for particular variables are provided in this report. The sample sizes can be estimated by multiplying the population by the weighting fraction, which is the sampling fraction corrected for nonresponse. The mean weighting fractions for selected groups are presented in Table E-3. For example, in Table 2-13 the population of agricultural science Ph.D.s in the labor force is 17,400. Multiplying by 0.107, the approximate sample size is 1,862. The sampling error of a reported statistic (for instance, employed those full-time, 94.9 percent) can be estimated by using the formula for s_p or by consulting Table E-2 and using rough approximations of the sample size and percentage in proportion form. In this case,

TABLE E-2 Approximate Sampling Errors for Various Statistics and Sample Sizes

Sample Size	Proportion 0.01 or 0.99	0.05 or 0.95	0.10 or 0.90	0.25 or 0.75	0.50
37,500	0.00051	0.00113	0.00155	0.00224	0.00258
12,100	0.00090	0.00198	0.00273	0.00394	0.00455
10,300	0.00098	0.00215	0.00296	0.00427	0.00493
9,000	0.00105	0.00230	0.00316	0.00456	0.00527
4,300	0.00152	0.00332	0.00457	0.00660	0.00762
2,000	0.00222	0.00487	0.00671	0.00968	0.01118
1,200	0.00287	0.00629	0.00866	0.01250	0.01443
800	0.00352	0.00771	0.01061	0.01531	0.01768
400	0.00497	0.01090	0.01500	0.02165	0.02500
200	0.00704	0.01541	0.02121	0.03062	0.03536
100	0.00995	0.02179	0.03000	0.04330	0.05000

$$s_p = \left(\frac{0.949\ (1-0.949)}{1,862} \right)^{1/2} = 0.0050, \text{ or } 0.5 \text{ percent.}$$

Similarly, the value in the table opposite 2,000 for 0.95 is 0.00487. The reader can construct the desired confidence interval by multiplying the standard error by the appropriate coefficient: $\pm 1\ s_p$ will provide a 68.26 percent confidence interval; $\pm 2\ s_p$, approximately a 95 percent interval, etc.

Table E-3 Mean Weighting Fractions for Selected Groups

Science/Engineering		Humanities	
TOTAL IN U.S.	0.086	TOTAL IN U.S.	0.102
Men	0.065	Men	0.070
Women	0.217	Women	0.182
Minority	0.118	Minority	0.220
Mathematics	0.122	History	0.059
Computer Science	0.209	Art History	0.248
Physics/Astronomy	0.079	Music	0.127
Chemistry	0.074	Speech/Theater	0.134
Earth/Envir. Sci.	0.154	Philosophy	0.135
Engineering	0.043	Other Humanities	0.115
Agricultural Sci.	0.107	English/American Lang. and Lit.	0.063
Medical Science	0.179	Classical Lang. and Lit.	0.255
Biological Sci.	0.113	Modern Lang. and Lit.	0.139
Psychology	0.078		
Social Science	0.056		

Sampling Error Estimates for Medians

Sampling errors for median salary estimates* presented in this report
were computed not by strata but for all observations n, the number of sample cases in a particular subgroup reporting a salary. Comparisons of sampling errors for ratios and proportions (see above) indicate only minor differences between those calculated by strata and that do not fully take into account sample design. The reader should interpret the confidence intervals as close approximations.

*The method for determining sampling errors of medians in this report was adapted from Morris H. Hansen, William N. Hurwitz, and William G. Madow, Sample Survey Methods and Theory, vol. 1 (John Wiley & Sons, Inc., New York, 1953), pp. 448-449.

From the estimated population distribution, a statistic, m, is computed as an estimator of M, the position measure. When m is a median (p_m), the proportion of cases in the derived distribution falling below the position measure equals 0.5. The sampling error of p_m is estimated by the formula

$$s_{p_m} = \left(\frac{p_m[1-p_m]}{n} \right)^{\frac{1}{2}} .$$

Two additional proportions are then computed:

$$p_1 = p_m - ks_{p_m}$$

$$p_2 = p_m + ks_{p_m}$$

The confidence interval for the median is set by calcuating m_1 and m_2, the values below which p_1 and p_2 of the population distribution fall. The level of confidence is determined by k and will be 68.26 percent when k = 1, approximately 95 percent when k = 2, etc. Because the values of m_1 and m_2 depend on the variability of the distribution, the reader is cautioned that corresponding values for 2 standard errors are not necessarily twice those for 1 standard error. An arbitrary decision was made not to report median salaries when the values calculated for m_1 and m_2 for 1 standard error exceeded the median salary by $2,000.

For example, in Table 2-8 an estimated median annual salary of $35,800 is reported for Ph.D. psychologists. This was computed on the basis of 2,783 sample observations. Therefore,

$$s_p \left(\frac{0.5\ (1-0.5)}{2,783} \right)^{\frac{1}{2}} = 0.0094.$$

To construct a 95 percent confidence interval, compute

$$p = 0.5 - 2[0.0094] = 0.4812 \text{ and}$$

$$p = 0.5 + 2[0.0094] = 0.5188,$$

which round to 0.48 and 0.52. The values m_1 = $35,200 (the value at the 48th percentile) and m_2 = $36,300 (the value at the 52nd percentile) are then determined and provide the bounds of this interval. Table E-4 contains the 95 percent confidence intervals of median salary estimates for selected categories.

TABLE E-4 95 Percent Confidence Intervals of Median Salaries for Selected Categories (in thousands of dollars)

	Science/ Engineering	(Reported Statistics)	Humanities	(Reported Statistics)
Total, Full-Time Employed Ph.D.s	40.0-40.4	(40.2)	30.5-30.8	(30.7)
Men	40.7-41.3	(40.9)	31.4-32.6	(31.9)
Women	31.5-32.1	(31.8)	26.4-27.3	(26.8)
Employed in Educational Institutions	36.0-36.4	(36.2)	30.9-31.4	(31.1)
Employed in Business/Industry	46.7-47.7	(47.2)	26.3-30.0	(27.8)
Employed in Federal Government, Civilian	44.2-45.3	(44.9)	27.6-30.4*	(28.6)
Employed in State/Local Government	32.8-35.6	(34.4)		
Mathematics	37.1-38.6	(37.8)		
Computer Sciences	40.7-44.2	(42.1)		
Physics/Astronomy	43.1-44.4	(43.9)		
Chemistry	42.2-43.6	(42.8)		
Earth/Environmental Sciences	40.0-41.4	(40.6)		
Engineering	45.9-47.3	(46.5)		
Agricultural Sciences	36.6-38.6	(37.4)		
Medical Sciences	39.5-40.5	(40.2)		
Biological Sciences	36.5-36.9	(36.7)		
Psychology	35.2-36.3	(35.8)		
Social Sciences	35.6-36.4	(36.0)		
History			32.4-34.3	(33.5)
Art History			29.0-31.1	(30.3)
Music			27.2-30.2	(28.9)
Speech/Theater			32.9-34.9	(34.0)
Philosophy			30.3-32.4	(30.9)
English/American Languages & Literature			29.5-30.5	(30.0)
Classical Languages & Literature			27.3-31.0	(30.0)
Modern Languages & Literature			29.0-30.3	(29.7)
Other Humanities			27.7-30.3	(29.2)

*Employed in federal government (civilian) or state/local government.

APPENDIX F

WEIGHTING PROCEDURE

Estimates in this report are based on weighted responses. The 2,405 individuals (in the total sample of 69,865) who were known to be deceased or out-of-scope prior to the survey were excluded and weighted for sample weights. The responses (44,277) received from the survey sample were assigned a response weight that is the product of the weight for nonresponse and the sample weight. Table F-1 shows the classification of the sample and the formulas used for calculating the weights.

Each stratum with fewer than two responses was merged with a similarly defined stratum in order to calculate sampling errors. Respondents in each stratum were assigned a weight equal to the integral part of the stratum's response weight, or the integral part plus one. Allocation of weights within a stratum was made at random so as to represent the stratum population. This technique avoids the necessity of rounding fractional estimates of totals.

For example, consider a stratum that contains 60 individuals of whom 15 were selected for the sample. One of the 15 is known to be deceased prior to the survey. This individual receives a sample weight, 60/15, or 4.0, and thus represents 4 individuals in the population. The number of survey sample cases in the stratum is 14. Of these 14 individuals, 10 responded. The average weight for the respondents in this stratum would be $[60/15] \cdot [14/10] = 5.6$. To obtain integer weights, 4 of the respondents (chosen at random) would each receive a weight of 5, thus representing 20 individuals in the population. The 6 remaining respondents would each receive a weight of 6, thus representing 36. Combined, the 10 respondents would represent 56 individuals in the stratum, who together with the 4 individuals estimated to be deceased represent the entire 60 individuals in the stratum.

Table F-1 Classification of Sample and Weighting for 1983 Survey of Doctorate Recipients

Group		Number in Sample	Type of Estimation Weight*
TOTAL SAMPLE		69,865	
EXCLUDED FROM SURVEY			
Known Deceased Prior to 1983 Survey**	1,989		Sample
Out-of-Scope***	416		Sample
Total		-2,405	
SURVEY SAMPLE		67,460	
Unable to Mail, No Valid Address		-7,304	
CONTACTED SAMPLE		60,156	
RESPONSES			
Good Responses		43,986	Response
Known Deceased as a Result of the 1983 Survey		291	Response
Total		44,277	

*The sample weights (Ws) and response weights (Wr) for each stratum were computed as follows:

$$Ws_h = \frac{N_h}{n_h}$$

where N_h and n_h are the respective population and sample sizes of the stratum (h).

$$Wr_h = \frac{N_h}{n_h} \cdot \frac{\hat{n}_h}{r_h}$$

where $\hat{n}_h$ is the number of survey sample cases in the stratum and r_h is the number of survey responses in that stratum.

**Based on data obtained through 1973, 1975, 1977, 1979, or 1981 survey responses or through address searches.

***Based on responses that indicated individuals either (1) held Ph.D.s from foreign institutions, were foreign citizens, and resided in foreign countries or (2) held doctorates in education or professional fields and were employed in nonscience/nonengineering positions.

APPENDIX G

RESPONSE ANALYSES

Methodology

Of the 67,460 individuals in the 1983 SDR survey sample, 44,277 (or 65.6 percent) responded to the 1983 survey. The nonrespondents are the composite of three groups: (1) those who declined to participate in the survey (N = 640); (2) those who were not mailed questionnaires because a valid address could not be obtained for them (N = 7,304); and (3) those who were presumably contacted but did not return their questionnaire (N = 15,239). To determine whether a bias exists as a result of nonresponse, comparisons between respondents and nonrespondents were made for a variety of demographic and employment characteristics.

Complete nonrespondent data on the following demographic variables--sex, year of Ph.D., and field of Ph.D.--were made available by the National Research Council's Survey of Earned Doctorates (SED), an annual survey of the total population of new Ph.D. recipients from U.S. institutions. The SED also provided information on age and citizenship for most of the FY1958-FY1982 Ph.D. recipients. Employment status data, on the other hand, was not available for the 1983 nonrespondents. To estimate employment figures for this group, one would ideally survey a random sample of the nonrespondents. Comparisons for differences between them and the respondents could then be made to provide an indication of whether bias existed for those variables.

Because the resources required to conduct a nonresponse bias survey are great, a different approach was adopted for this report. The reliability of the response data was evaluated, instead, by comparing the employment status data of early respondents to that of late respondents.* The respondents to the initial mailing of May 1983 were compared with respondents to the follow-up mailings of July, September, and November. This latter group is a surrogate for the nonrespondents to the survey; such an approach has obvious limitations, since it relies on a presumption (of which there is no assurance) that late respondents resemble nonrespondents more closely than they resemble the

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*For an example of this approach, see Commission on Human Resources, Item Response Analysis: 1979 Survey of Doctorate Recipients, Washington, D.C.: National Academy Press, 1980.

early respondents. It does, however, provide the best available estimate of nonresponse bias with respect to employment characteristics.

Analysis of Nonresponse Bias

If a given proportion of the population possesses a certain characteristic, the expectation is that, for no bias to have occurred, a roughly equal proportion of both the number of respondents and the number of nonrespondents will also possess that characteristic. The extent to which the actual proportionate values observed for the respondents and the nonrespondents deviate from the expected value (i.e., the population proportion) is an indication of the magnitude of the bias. For example, if 86.5 percent of the science and engineering Ph.D.s were male (as in Table G-1, page 144), the expected proportion of male science and engineering Ph.D. respondents would be approximately 86.5 percent. The same approximate value would be expected for male nonrespondents. The actual observed values of male respondents in the survey was 86.1 percent (a deviation from the expected 86.5 percent of only 0.4 percentage points) and for male nonrespondents was 87.2 percent (a deviation of only 0.7 percentage points). These values would neither suggest over nor underrepresentation of males in the science and engineering sample and, therefore, bias would not be indicated. If, however, males constituted 95 percent of the respondents (a deviation of 8.5 percentage points) but only 78 percent of the nonrespondents (a deviation of 8.5 percentage points), the absolute difference between the two groups on the characteristic "maleness" would have been 17 percentage points. In this case, response bias would exist. In the actual survey figures, the absolute difference between male science and engineering respondents and nonrespondents was small (only 1.1 percentage points).

Analysis for Bias of Demographic Characteristics

Sex. As previously established for the male science and engineering groups, deviations from the population proportions for female science and engineering respondents and nonrespondents were small and the resulting absolute difference between them negligible. This was also observed for both sexes in the humanities. Therefore one can conclude that there was no response bias for the variable of sex.

Year of Ph.D. For both the science/engineering and humanities Ph.D.s, deviations of response and nonresponse values from the expected population proportions for year of Ph.D. were small (see Table G-2, page 145). Nonresponse bias for each cohort is not indicated.

Field of the Ph.D. For field of Ph.D., deviation of response and nonresponse values from expected values were small (see Table G-3, page 145). The respondent and nonrespondent groups were roughly equivalent with respect to this variable.

Age and Citizenship. Data on age and citizenship are available for

FY1958-1982 Ph.D. recipients only, or 85 percent of the science/engineering and humanities samples. Deviations for respondents and nonrespondents from the expected median age are not exhibited (see Table G-4, page 146). The ages of respondents and nonrespondents are essentially equivalent (values were rounded to the full year) for both the scientists/engineers and the humanists. As such, bias for age is not indicated.

Of the five demographic variables for which nonresponse bias was examined, the only variable to suggest bias was citizenship (see Table G-5, page 146). While 88.3 percent of the science/engineering Ph.D. population was U.S. citizens, 94.4 percent of the respondents (a deviation of 6.1 percentage points) and only 75.5 percent of the nonrespondents (a deviation of 12.8 percentage points) were U.S. citizens. This gap was not as pronounced for the humanities sample. The proportion of the humanities Ph.D. population who were U.S. citizens was 94.8 percent, the proportion of respondents was 96.8 percent (a deviation of 2.0 percentage points), and that of nonrespondents was 91.0 percent (a deviation of 3.8 percentage points).

Analysis for Bias of Employment Characteristics

Since the population proportions are not available for employment variables, deviation values cannot be computed. As such, discussion of nonresponse bias is restricted to comparisons of early response and late response groups.

Employment Status. For both scientists/engineers and humanists, differences between early and late respondents were small and not of concern (see Tables G-6, page 146, and G-7, page 147). Bias was not evident for the variables of employment status.

Field of Employment. There were no large differences between early and late science/engineering respondents for field of employment (see Table G-8, page 147). However, for the humanities, differences in the fields of history and English and American language/literature were notable: doctorates in these two employment fields were slightly less likely to respond late (see Table G-9, page 148). As late respondents are surrogates of nonrespondents, the conclusion is that they are more likely to respond and, therefore, may be slightly overrepresented for the variable of employment field.

Type of Employer. For the science and engineering group, differences between early and late respondents were small for type of employer (see Table G-10, page 148). Because a notably higher percentage of humanists employed in 4-year academic institutions responded early as compared with their counterparts, there may be a slight overrepresentation of these individuals in the sample (see Table G-11, page 149).

Primary Work Activity. For both science/engineering and humanities, differences between early and late respondents were small and not of concern for primary work activity (see Tables G-12, page 149, and G-13, page 150).

Median Annual Salary. For both science/engineering and the humanities, median salaries of early and late respondents differed to a small degree, with early respondents earning the higher of the two salaries in both cases (see Table G-14, page 150). For science and engineering the difference was approximately $700; for the humanities it was approximately $600. These differences are slight fractions of the whole salary, however, and are not of concern.

Conclusions

While some differences occurred between the groups compared in this section, only in the case of citizenship was nonresponse bias suggested. The differences for the other variables were generally within the limits of the expected sampling error. The data presented in the preceding tables show, though not conclusively, that population estimates derived from the 1983 SDR were not seriously affected by nonresponse bias.

In the case of the variable, citizenship, response rates for U.S. citizens were markedly higher than response rates for foreign citizens. This difference was expected. The analysis of the effect of nonresponse bias on the 1975 SDR had found similar differences in the response rates for U.S. citizens and foreign citizens,* resulting in the addition of citizenship as stratifying variable for the selection of the 1979, 1981, and 1983 survey samples. Separate population weights were calculated for U.S. citizens and foreign citizens in an attempt to compensate for the differences that occur in their response rates (see Appendix F).

Table G-1 Response Status: Science/Engineering and Humanities Ph.D.s (1940-1982 Graduates) by Sex (in percent)

	Total Population	Male	Female
Science/Engineering	404,167	86.5	13.5
Respondents	272,263	86.1	13.9
Nonrespondents	131,904	87.2	12.8
Humanities	89,343	71.7	28.3
Respondents	58,389	70.9	29.1
Nonrespondents	30,954	73.3	26.7

*Andrew W. Spisak and Betty D. Maxfield, The Effects of Non-Response Bias on the 1975 Survey of Doctoral Scientists and Engineers, Washington, D.C.: National Academy of Sciences, 1979.

Table G-2 Response Status: Science/Engineering and Humanities Ph.D.s (1940-1982 Graduates) by Calendar Year of Doctorate (in percent)

	Total	1940-1949	1950-1959	1960-1969	1970-1974	1975-1979	1980-1982*
Science/Engineering	404,167	4.6	12.9	26.9	23.0	21.6	11.0
Respondents	272,263	4.9	14.0	27.3	22.3	20.6	10.9
Nonrespondents	131,904	4.0	10.8	26.0	24.4	23.5	11.3
Humanities	89,343	4.1	11.4	24.1	26.4	23.9	10.1
Respondents	58,389	4.1	11.7	24.7	25.6	23.4	10.6
Nonrespondents	30,954	4.2	10.9	23.0	27.9	24.7	9.3

*Excludes Ph.D.s awarded July-December 1982.

Table G-3 Response Status: Science/Engineering and Humanities Ph.D.s by Field of Doctorate (in percent)

Field of Doctorate	Total Survey Sample	Respondents	Nonrespondents
Total Science/Engineering (N)	404,167	272,263	131,904
Mathematics	5.0	5.0	5.1
Computer Sciences	.6	.6	.6
Physics/Astronomy	8.0	7.8	8.3
Chemistry	12.8	13.2	12.0
Earth/Envir. Sciences	3.3	3.6	2.8
Engineering	14.9	13.8	17.0
Agricultural Sciences	4.9	5.1	4.5
Medical Sciences	3.7	3.6	3.9
Biological Sciences	17.9	18.6	16.4
Psychology	13.0	13.1	12.8
Social Sciences	15.8	15.4	16.5
Total Humanities (N)	89,343	58,389	30,954
History	23.6	24.8	21.3
Art History	2.8	2.9	2.5
Music	6.7	7.3	5.7
Speech/Theater	4.5	4.0	5.3
Philosophy	7.9	7.5	8.6
English/American Lang & Lit	26.4	26.3	26.7
Classics Lang & Lit	2.3	2.3	2.2
Modern Lang & Lit	17.7	17.5	18.0
Other Humanities	8.2	7.4	9.7

Table G-4 Response Status: Science/Engineering and Humanities Ph.D.s FY1958-1982 by Median Age

	Science/Engineering	Humanities
Total Sample	37	39
Respondents	37	39
Nonrespondents	37	39

Table G-5 Response Status: Science/Engineering and Humanities Ph.D.s FY1958-1982 by Citizenship

	Total Population	U.S.	Foreign	No Report
Science/Engineering Total	341,679	88.3	11.7	1.3
Respondents	230,497	94.4	5.6	
Nonrespondents	111,182	75.5	24.5	3.9
Humanities Total	76,819	94.8	5.2	1.6
Respondents	50,814	96.8	3.2	
Nonrespondents	26,005	91.0	9.0	4.7

Table G-6 Employment Status of Science/Engineering Ph.D.s by Response Wave (in percent)

1983 Employment Status	Total Response	Early Response	Late Response
Total Population (N)	387,263	268,876	118,387
Employed Full-Time	86.5	86.8	85.9
Employed Part-Time	4.1	4.0	4.3
Postdoctoral Appointment	2.8	2.9	2.5
Not Employed	5.7	5.4	6.3
Seeking Employment	0.9	0.9	1.0
Not Seeking Employment	0.9	0.8	1.2
Retired	3.6	3.4	3.9
Other	0.2	0.2	0.2
No Report	0.9	0.9	1.0

Table G-7 Employment Status of Humanities Ph.D.s by Response Wave (in percent)

1983 Employment Status	Total Response	Early Response	Late Response
Total Population (N)	85,141	56,864	28,277
Employed Full-Time	82.0	82.6	80.8
Employed Part-Time	6.7	6.0	8.0
Postdoctoral Appointment	1.2	1.3	1.1
Not Employed	9.0	9.0	9.0
Seeking Employment	1.5	1.6	1.4
Not Seeking Employment	1.7	1.6	1.8
Retired	5.3	5.2	5.3
Other	0.6	0.6	0.5
No Report	1.1	1.1	1.1

Table G-8 Field of Employment of Science/Engineering Ph.D.s by Response Wave (in percent)

1983 Field of Employment	Total Response	Early Response	Late Response
Total Employed (N)	361,747	252,059	109,688
Mathematics	3.8	3.9	3.6
Computer/Information Sciences	2.9	3.0	2.7
Physcis/Astronomy	5.4	5.8	4.3
Chemistry	9.5	10.1	8.1
Earth/Environmental Sciences	4.3	4.5	3.8
Engineering	15.5	15.8	14.9
Agricultural Sciences	4.3	4.5	4.0
Medical Sciences	6.0	6.1	5.6
Biological Sciences	14.7	15.4	12.9
Psychology	11.0	11.0	11.0
Social Sciences	11.1	11.4	10.6
Nonscience/Nonengineering	6.5	6.4	6.7
No Report	5.1	2.1	11.9

Table G-9 Field of Employment of Humanities Ph.D.s by Response Wave (in percent)

1983 Field of Employment	Total Response	Early Response	Late Response
Total Employed (N)	76,548	51,136	25,412
History	16.0	18.0	12.1
Art History	2.5	2.6	2.3
Music	6.0	5.9	6.1
Speech/Theater	2.8	2.9	2.7
Philosophy	4.9	5.2	4.4
English/American Lang. & Lit.	19.0	20.5	15.8
Classical Languages & Lit.	1.4	1.6	1.1
Modern Languages & Literature	12.4	12.8	11.4
Other Humanities	7.5	7.3	8.0
Nonhumanities	19.8	19.9	19.5
No Report	7.7	3.3	16.6

Table G-10 Type of Employer of Science/Engineering Ph.D.s by Response Wave (in percent)

1983 Type of Employer	Total Response	Early Response	Late Response
Employed Population* (N)	350,871	244,129	106,742
Educational Institution	52.2	52.8	50.7
4-Year Coll/Univ/Med Sch.	50.0	50.5	48.7
2-Year College	1.4	1.5	1.2
Elem/Secondary School	0.8	0.8	0.8
Business/Industry+	31.7	31.2	33.0
U.S. Government	7.6	7.8	7.2
State/Local Government	2.0	1.9	2.3
Hospital/Clinic	2.8	2.7	3.0
Other Nonprofit Organization	3.1	3.1	3.1
Other	0.3	0.3	0.3
No Report	0.2	0.2	0.3

*Excludes postdoctoral appointees.
+Includes self-employed.

Table G-11 Type of Employer of Humanities Ph.D.s by Response Wave (in percent)

1983 Type of Employer	Total Response	Early Response	Late Response
Employed Population* (N)	75,486	50,382	25,104
Educational Institution	82.9	84.1	80.3
4-Year Coll/Univ/Med. Sch	74.8	76.8	70.8
2-Year College	5.1	4.6	6.1
Elem/Secondary School	3.0	2.8	3.5
Business/Industry+	8.8	7.8	10.8
U.S. Government	2.1	2.2	1.8
State/Local Government	1.7	1.7	1.5
Hospital/Clinic	0.2	0.3	0.2
Other Nonprofit Organization	4.0	3.6	4.8
Other			0.1
No Report	0.3	0.3	0.4

*Excludes postdoctoral appointees.
+Includes self-employed.

Table G-12 Primary Work Activity of Science/Engineering Ph.D.s by Response Wave (in percent)

1983 Primary Work Activity	Total Response	Early Response	Late Response
Employed Population* (N)	350,871	244,129	106,742
Teaching	29.8	29.7	30.0
Research/Development/Design	32.7	33.5	31.0
Management/Administration	17.3	18.0	15.8
of Research and Development	8.9	9.2	8.3
of Education/Other Programs	8.4	8.8	7.5
Consulting/Professional Services	10.6	10.1	11.7
Writing/Editing	2.1	2.3	1.6
Marketing/Operations/Inspection	3.3	3.6	2.7
Other	2.1	1.9	2.5
No Report	2.1	0.9	4.8

*Excludes postdoctoral appointees.

Table G-13 Primary Work Activity of Humanities Ph.D.s by Response Wave (in percent)

1983 Primary Work Activity	Total Response	Early Response	Late Response
Employed Population* (N)	75,486	50,382	25,104
Teaching	66.3	67.0	65.1
Research and Development	4.4	4.9	3.4
Consulting/Professional Services	3.6	3.6	3.5
Management/Administration	11.4	12.3	9.5
Writing/Editing	5.1	5.3	4.8
Archival Work	0.5	0.5	0.4
Curatorial Work	0.4	0.4	0.3
Performing Arts	0.8	0.5	1.2
Other	4.4	4.0	5.2
No Report	3.2	1.6	6.6

*Excludes postdoctoral appointees.

Table G-14 Median Annual Salary of Science/Engineering and Humanities Ph.D.s by Response Wave (in thousands of dollars)

	Total Response	Early Response	Late Response
Science/Engineering	$40.2	$40.3	$39.7
Humanities	$30.7	$30.9	$30.2

APPENDIX H

FINE FIELD OF EMPLOYMENT

TABLE H-1 Doctoral Scientists and Engineers in the United States, 1983

1983 Fine Field of Employment	Est. N
Total Population	361,747
Mathematics Total	13,720
Algebra	1,112
Analysis & Functional Anal.	1,787
Geometry	341
Logic	226
Number Theory	387
Probability	363
Math. Statistics	2,478
Topology	645
Operations Research	719
Applied Mathematics	2,304
Combinatorics & Fin. Math.	382
Mathematics, General	2,532
Mathematics, Other	444
Computer & Information Sci Tot	10,663
Theory	452
Software Systems	5,068
Hardware Systems	428
Intelligent Systems	861
Computer Sciences, Other	2,220
Information Sci. & Systems	1,634
Physics/Astronomy Total	19,386
Astronomy	745
Astrophysics	1,464
Atomic & Molecular Physics	1,132
Electromagnetism	437
Acoustics	493
Fluids	375
Plasma Physics	1,443
Optics	1,463
Elementary Particles	1,760
Nuclear Structure	788
Polymer Physics	284
Solid State	2,999
Physics, General	3,341
Physics, Other	2,662
Chemistry Total	36,869
Analytical Chemistry	5,201
Inorganic Chemistry	2,080
Synth. Inorg. & Organomet.	732
Organic Chemistry	6,903
Synth. Organ. & Nat. Prod.	1,784
Nuclear Chemistry	339
Physical Chemistry	4,219
Theoretical Chemistry	263
Structural Chemistry	288
Agricultural & Food	556
Pharmaceutical Chemistry	1,534
Polymers	4,623
Biochemistry	2,628
Chemistry, General	2,398
Chemistry, Other	3,321
Earth, Environmental & Marine Sciences Total	15,554
Mineralogy, Petrology	726
Geochemistry	883
Stratigraphy, Sediment.	967
Paleontology	554
Structural Geology	400
Geophysics (Solid Earth)	1,546
Geomorph., Glacial Geolology	254
Applied Geology, Etc.	1,412
Earth Sciences, General	794
Earth Sciences, Other	863
Atmospheric Physics & Chem.	847
Atmospheric Dynamics	330
Atmos./Meteorol. Sci., Other	904
Environmental Sci., General	1,485
Environmental Sci., Other	999
Hydrology	899
Oceanography	1,043
Marine Sciences, Other	648
Engineering Total	56,004
Aero- & Astronautical	3,344
Agricultural Engineering	827
Bioengrg. & Biomed. Engrg.	1,402
Civil Engineering	3,857
Chemical Engineering	6,057
Ceramic Engineering	617
Communications Engineering	1,743
Computer Engineering	1,497
Electrical Engineering	3,707
Electronics Engineering	4,387
Industrial/Manufacturing	1,056
Nuclear Engineering	2,235
Engineering Mechanics	1,656
Engineering Physics	1,124
Mechanical Engineering	4,932
Metallurgy & Phys. Met.	1,935
Systems Design & Sys. Sci.	2,301
Operations Research	1,309
Fuel Tech. & Petrol. Engr.	1,387
Sanitary/Environmental	1,110
Naval Arch. & Marine Engr.	175
Mining Engineering	289
Ocean Engineering	238
Polymer Engineering	899
Materials Sci. Engineering	3,554
Engineering, General	1,616
Engineering, Other	2,750
Agricultural Sciences Total	15,593
Agricultural Economics	2,315
Animal Breeding & Genetics	415
Animal Nutrition	1,012
Animal Sciences, Other	907
Agronomy	1,137
Plant Pathology	1,054
Plant Breeding & Genetics	1,123
Plant Sciences, Other	410
Food Science	1,165
Forestry	1,256
Horticulture	1,018
Soils & Soil Science	1,140
Fisheries Sciences	495
Wildlife Management	474
Agricultural Sci., General	616
Agricultural Sci., Other	1,056

TABLE H-1 Doctoral Scientists and Engineers in the United States, 1983 (continued)

1983 Fine Field of Employment	Est. N
Medical Sciences Total	21,597
Medicine & Surgery	3,643
Public Health & Epidemiology	1,536
Veterinary Medicine	1,047
Hospital Administration	395
Nursing	1,101
Parasitology	449
Environmental Health	584
Speech Path. & Audiology	1,706
Human & Animal Pathology	994
Pharmacology	3,127
Pharmacy	1,154
Medical Sciences, General	1,290
Medical Sciences, Other	4,571
Biological Sciences Total	50,394
Biochemistry	6,507
Biophysics	1,433
Biometrics, Biostatistics	1,202
Anatomy	1,642
Cell Biology/Cytology	2,299
Embryology	318
Immunology	2,250
Endocrinology	1,024
Plant Pathology	206
Botany	2,015
Ecology	2,573
Bacteriology	359
Microbiology	4,173
Human & Animal Physiology	2,945
Plant Physiology	1,019
Zoology	1,810
Plant Genetics	377
Human & Animal Genetics	1,372
Entomology	2,539
Molecular Biology	3,977
Food Science & Technology	423
Behavior/Ethology	260
Nutrition & Dietetics	833
Neurosciences	3,030
Toxicology	1,726
Biological Sciences, General	2,365
Biological Sciences, Other	1,717
Psychology Total	39,731
Clinical Psychology	20,044
Cognitive Psychology	679
Counseling & Guidance	1,462
Developmental & Gerontol.	1,810
Educational Psychology	661
School Psychology	1,603
Experimental Psychology	2,817
Comparative Psychology	244
Physiological Psychology	1,038
Industrial & Personnel	2,204
Personality Psychology	234
Psychometrics	304
Quantitative Psychology	207
Social Psychology	1,447
Psychology, General	2,198
Psychology, Other	2,779
Social Sciences Total	40,317
Anthropology	2,628
Archeology	775
Communications	1,577
Linguistics	923
Sociology	6,723
Economics	10,536
Econometrics	414
Social Statistics	443
Demography	525
Geography	2,090
Area Studies	372
Political Science	6,211
Public Administration	1,726
Public Policy Studies	1,310
International Relations	1,161
Criminology & Crim. Justice	957
Urban & Regional Planning	672
History & Phil. of Science	121
Social Sciences, General	454
Social Sciences, Other	699
Arts & Humanities Total	2,008
American History	24
History, Other	194
History & Crit. of Art	54
American Studies	40
Music	94
Theatre & Theatre Criticism	45
Speech as a Dram. Art/Debate	983
Religious Studies	180
Philosophy	110
Comparative Literature	4
Letters, Other	57
Humanities, General	74
Humanities, Other	149
Languages & Literature Total	593
American	10
English Language	298
English Literature	24
Classics	20
German	30
Russian	45
French	2
Spanish & Portuguese	42
Italian	2
Other Languages	120
Educational, Professional, & Other Fields Total	20,954
Education	5,278
Applied Art	134
Theology	310
Business & Management	8,083
Home Economics	99
Journalism	485
Law, Jurisprudence	1,174
Social Work	351
Architec. & Envir. Design	200
Library & Archival Sciences	199
Prof. Field, General	261
Prof. Field, Other	1,073
Other Fields	3,307
No Report	18,364

TABLE H-2 Ph.D.s in the Humanities and Selected Social Sciences in the United States, 1983

1983 Fine Field of Employment	Est. N
Total Population	76,548
Mathematics Total	198
Algebra	7
Logic	150
Math Statistics	27
Mathematics, General	10
Mathematics, Other	4
Computer Sciences Total	1,212
Theory	43
Software Systems	564
Hardware Systems	10
Intelligent Systems	62
Computer Sciences, Other	322
Information Sci. & Systems	211
Physics/Astronomy Total	30
Physics, General	19
Physics, Other	11
Earth, Envir, & Mar Sci Total	56
Structural Geology	15
Geophysics (Solid Earth)	5
Atmos./Meteorol. Sci., Other	10
Environmental Sci., General	22
Environmental Sci., Other	4
Engineering Total	219
Aero- & Astronautical	11
Civil Engineering	15
Communications Engineering	19
Computer Engineering	93
Electronics Engineering	7
Industrial/Manufacturing	10
Nuclear Engineering	32
Systems Design & Sys. Sci.	20
Engineering, Other	12
Agricultural Sciences Total	114
Agricultural Economics	18
Animal Sciences, Other	10
Food Sciences	20
Horticulture	49
Agricultural Sci., General	17
Medical Sciences Total	323
Medicine & Surgery	101
Publ Hlth & Epidemiology	18
Hospital Administration	36
Nursing	30
Environmental Health	2
Speech Pathology & Audiology	54
Medical Sciences, General	4
Medical Sciences, Other	78
Biological Sciences Total	24
Ecology	7
Zoology	2
Neurosciences	15
Psychology Total	304
Clinical Psychology	108
Counseling & Guidance	81
Developmental & Gerontol.	29
Educational Psychology	5
School Psychology	18
Industrial & Personnel	15
Psychology, General	4
Psychology, Other	44
Social Sciences Total	2,240
Anthropology	73
Communications	503
Sociology	52
Economics	76
Social Statistics	5
Demography	23
Geography	42
Area Studies	258
Political Science	295
Public Administration	100
Public Policy Studies	145
International Relations	180
Criminology & Crim. Justice	87
Urban & Regional Plannning	58
Social Sciences, General	129
Social Sciences, Other	214
Arts & Humanities Total	31,041
American History	5,695
European History	3,343
History & Phil. of Sci.	201
History, Other	3,029
Comparative Literature	615
Linguistics	988
History & Crit. of Art	1,885
Archeology	423
American Studies	392
Music	4,579
Theatre & Theatre Criticism	1,585
Speech as a Dram. Art/Debate	580
Religious Studies	1,379
Philosophy	3,780
Letters, Other	765
Humanities, General	916
Humanities, Other	886
Languages & Literature Total	24,461
American	3,678
English Language	3,339
English Literature	7,492
Classical	1,104
German	1,654
Russian	685
French	2,392
Spanish & Portuguese	2,809
Italian	302
Other Languages	1,006
Educational, Professional, & Other Fields Total	10,427
Education	3,553
Applied Art	77
Theology	736
Business & Management	1,856
Home Economics	19
Journalism	444
Law, Jurisprudence	654
Social Work	146
Architec. & Environ. Design	49
Library & Archival Sciences	851
Prof. Fields, General	46
Prof. Fields, Other	596
Other Fields	1,400
No Report	5,899

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